SERVICE MANUAL

COMMODORE

PC 10/20 II

DEUTSCH/ENGLISCH

Commodore Büromaschinen GmbH
Auslieferungslager Frankfurt
Friedrich-Seele-Straße 10
3300 Braunschweig
Telefon (05 31) 89 50 63*
Fax (05 31) 8 57 74

INHALTSVERZEICHNIS

MANUAL PC 10/20 UND PC10/20 II

A. SCHEMATIC	SEITE VON	SEITE
CPU PCB	1 - 5	1
I/O PCB	1 - 4	5
COMBINED MAINBOARD	1 - 9	9
RAM EXTENSION CARD 384 KB	1 - 1	18
MONOCHROME VIDEO PCB	1 - 4	19
ADVANCED MONOCHROME VIDEO PCB	1 - 6	23
CHEMATIC AGA KARTE	1 - 7	29
CHEMATIC PARADISEM KARTE	1 - 8	36
MONITOR BM 7513/00	1 - 1	44
KEYBOARD G80-0499	1 - 1	45
NETZTEIL 120W 2-64-3	1 - 1	46
MOTORREGELUNG 6128	1 - 1	47
CHEMATIC 6128	1 - 1	48
CHEMATIC 6128 C	1 - 1	49
CHEMATIC 6129	1 - 1	50
ALPS DFC 222A	1 - 45	51
HARDDISK TM 252 TANDON	1 - 3	96
CHEMATIC WD 10029-WX 2	1 - 7	99

B. PC - RUNDSCHREIBEN		
CPU REWORK	1 - 4	106
UMBAU PC MONITOR FÜR PARADISE- U. AGA-KARTE	1 - 2	110
FTZ. NUMMERN FÜR PC 10/20	1 - 1	112
1901 MONITOR FÜR PC 10/20	1 - 1	113

C. DIAGNOSTIC MANUAL		
DIAGNOSTIC MAUAL	1 - 10	114

D. ERSATZTEILKATALOG		
ERSATZTEILKATALOG (STAND: 01.05.85)	1 - 13	124

05/86

REVISIONS				
LTR	ZONE	DESCRIPTION	DATE	APPROVED
I		PRODUCTION RELEASE		
J		REVISED PER ECO 850134	9-12-85	

NMI 4
INTR 2
PWRGOOD 5
I/O CHRDY 5
DACKØ 2
¥SDET 4
HRQ 2
+5V
R1 2K2
R2 510
R3 510
R4 33
R5 33
R6 33
R7 2K2
R8 2K2
R9 2K2
R10 2K2
R19 2K2
R24 2K2
TR 2-40p
Q1 14.31818 MHz
U57 8284A
U58 74S74
U60 1/6 74LSØ4
U53 1/4 74LSØ2
U54 74LS175
U55 74LSØØ
U56 74LS3Ø
U59 8088
U62 8087
U61 8288
U63 74LS373
U64 1/2 74LS244
U65 74LS373
U67 74LS245
RESET 4
RESET 4,5
PCLK 2,5
OSC 3,4
CLK 3,4
DMACLK 2
DMARDY 2
DMAAEN 2
HLDA 2
AEN 2,4
AEN 3,4
BAØ-19 1-5
NPINT 4
MEMR 3,4,5
MEMW 3,4,5
IORC 3,4,5
IOWC 3,4,5
INTA 2
ALE 3
DØ-7 2,3,5

UNLESS OTHERWISE SPECIFIED	DRAWN BY:	DATE
TOLERANCES ON: DECIMALS .X ±0 .XX ±0 .XXX ±0 ∠ ±0	FoWen	09-07-84
	CHKD:	10-10-84
	ENGR:	09-07-84
	APPR:	
MATERIAL:	USED ON: CBM-PC 10/20	NEXT ASSY
FINISH:		

commodore

SCHEMATIC CPU PCB 1

SIZE C | 380400 | REV J

SCALE NONE | SHEET 1 OF 1

REVISIONS				
LTR	ZONE	DESCRIPTION	DATE	APPROVED
		SEE SHEET 1		

BAØ-19 1-5

DBDIR 4

IRQ1 5 KBINT
IRQ2 5
IRQ3 5
IRQ4 5 ACIINT
IRQ5 5
IRQ6 5 FDCINT
IRQ7 5 PRNINT
INTA 1

PICCS 4

TMR2GATE 4

PCLK 1

TMRCS 4
IORC 1,2
IOWC 1,2
BAEN 3

U47 1/4 74HCT32

U74 8259A

U48 1/4 74LS08

U77 1/2 74LS74

U71 8253A-5

U72 74LS245

D0-7 1,3,5

AEN 1

XRESET 4

PGCS 4

INTR 1

DB0-7 4

TMR2 4

DMAAEN 1

DREQ0
DREQ1 5
DREQ2 5
DREQ3 5

DMACLK 1
DMARDY 1
HLDA 1
DMACS 4

U70 8237A-5

U69 74LS670

U68 74LS373

U64 1/2 74LS244

U66 74LS245

U49 74LS04

DACK0
DACK1
DACK2
DACK3
HRQ
EOP

1-5 BAØ-19

IORC 2,4,5
IOWC 2,4,5
MEMR 3,4,5
MEMW 3,4,5
DACKØ 1,3,5
DACK1 5
DACK2 4,5
DACK3 5
HRQ 1
TC 5

UNLESS OTHERWISE SPECIFIED TOLERANCES ON: DECIMALS .X ±, .XX ±, .XXX ±, ∠ ±°	DRAWN BY: Fowlkes	DATE 09-07-84	commodore
	CHKD: SB	10-10-84	SCHEMATIC CPU PCB 2
	ENGR:	09-12-84	
	APPR:		
MATERIAL:	USED ON CBM-PC 10120	NEXT ASSY	SIZE C 330 400 REV J
FINISH:			SCALE NONE SHEET 2 OF 5

REVISIONS				
LTR	ZONE	DESCRIPTION	DATE	APPROVED
		SEE SHEET 1		

BA0-19 1-5

[1] FOR 2764:
JA3, JA5, JA7 CLOSED

FOR 2364:
JA4, JA6, JA8 CLOSED

RA1 — R-PACK 4×33 — RA2 — R25 33 — R26 33 — R14A 33 — R14B — R14C

U41 74S158 — U38 74S158 — U37 74S158 — U49 ½ 74LS04

U1 U2 U3 U4 U5 U6 U7 U8 U9 — BANK0 — 36× D-RAM

U10 U11 U12 U13 U14 U15 U16 U17 U18 — BANK1

U19 U20 U21 U22 U23 U24 U25 U26 U27 — BANK2

U28 U29 U30 U31 U32 U33 U34 U35 U36 — BANK3

MD0 MD1 MD2 MD3 MD4 MD5 MD6 MD7

BA13

U44 [1] 2764/2364 — R21 100 — JA3 JA4 JA5 JA6 JA7 JA8 — +5V

D0-7 [1,2,5]

U42 74LS245 — DIR OE

U39 74S280 — NC EVEN ODD

U48 ¼ 74LS08

U51 ½ 74LS74

U43 825153 — R-PACK 4×33 — MEMSEL ROMSEL MEMRDLY RAMENB

U40 (DELAY-LINE) 50ns 100ns

R15 2K2 — JA1

R17 33 — R18 33

U47 2/4 74HCT32 — U47 ¼ 74HCT32

U50 ⅓ 74LS11

U53 ¼ 74LS02

DACK0 — LSW — AEN — MEMR — MEMW — ENKAMPCK — PCK — PCK — BAEN

UNLESS OTHERWISE SPECIFIED: TOLERANCES ON: DECIMALS .X ±, .XX ±, .XXX ±, ∠'S ±	DRAWN BY: Fabian	DATE 13-07-84	commodore	
	CHKD:	10-10-84	SCHEMATIC CPU PCB	3
	ENGR:	07-04-85		
MATERIAL:	APPR:		SIZE C	380400 REV J
FINISH:	USED ON C64-PC 10/20	NEXT ASSY	SCALE VOID	SHEET 3 OF 5

REVISIONS				
LTR	ZONE	DESCRIPTION	DATE	APPROVED
		SEE SHEET 1		

BAØ-19 1-5

RA4 R-PACK 8×2K2 +5V

SW SW1 2 3 4 5 6 7 SW8

U52 74LS257

3 LSW

DBØ DB3

U76 ½74LS244 DB4 DB7

R62CS 4

NPINT 1

TMR2 2

PCK 3

½74LS08 U48

R22 2K2 +5V

U55 ¼74LS00

IOCHCK 5

U60 ⅙74LS04

U49 ⅙74LS04

U50 ⅓74LS11

ENB IOCK

PCK 3

½74LS74 U51

FROM SHEET 215 UPU2

DB7 NC

NMICS 4

RESET 1

U75 74LS273 DBØ DB7

W61CS 4

R61CS 4

DBØ-7 2

C76

GND

U48 ¼74LS08

U53 ¼74LS02

U49 ⅙74LS04

U73 74LS245 DBØ DB7

+5V DIR OE

BAØ BA9 U46 82S100

IOWC IORC MEMW MEMR AEN ACIOPT

R23 2K2 JA2

5 SPEAKER

DACK2 2

1 NMI

3 ENBKAMPCK

5 ENBKB

5 HLDKBCLK

2 TMR2GATE

CLK OSC RESET AEN 1

U76 ½74LS244

5 XCLK

5 XOSC

5,2 XRESET

5 XAEN

2 DMACS

2 TMRCS

U45 74154

1 NC

2 PICCS

5 PRNRB

5 KBCS

4 R61CS

4 W61CS

4 R62CS

2 PGCS

4 NMICS

5 ACICS

5 PKNDCS

5 PRNSCS

5 PRNCCS

5 FDCCS

5 FCPCS

U50 ⅓74LS11

5 DAFEN

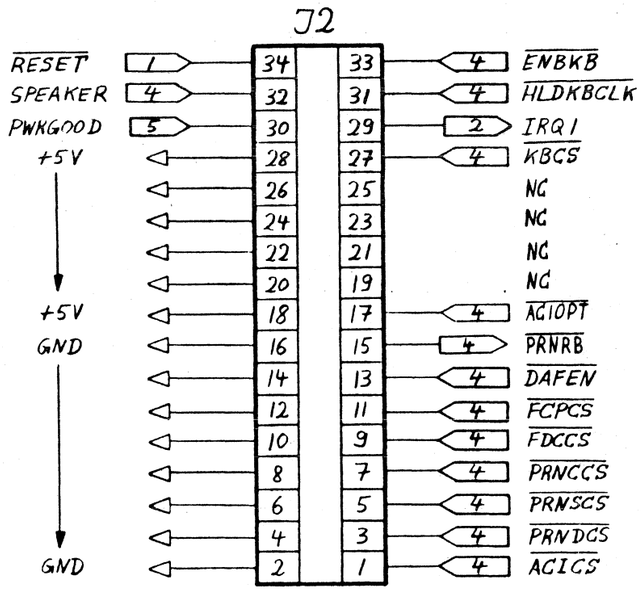
1 WSDET

2 DBDIR

UNLESS OTHERWISE SPECIFIED TOLERANCES ON: DECIMALS .X .XX .XXX ∠° ± ± ± ±	DRAWN BY: F.Vicari	DATE 09-07-84	commodore
	CHKD: Sch	10-10-84	SCHEMATIC CPU PCB 4
	ENGR: VV	09-07-84	
	APPR:		
MATERIAL:	USED ON CBM-PC 10/20	NEXT ASSY	SIZE C 380400 REV J
FINISH:			SCALE NONE SHEET 4 OF 5

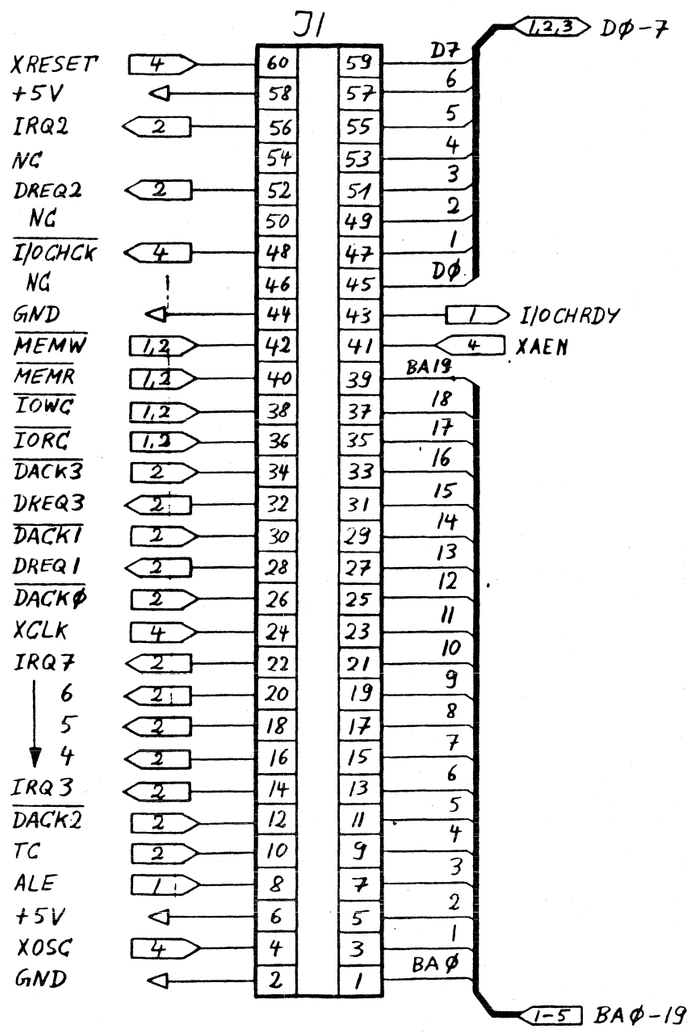
REVISIONS				
LTR	ZONE	DESCRIPTION	DATE	APPROVED
		SEE SHEET 1		

CPU-I/O-CONNECTOR II



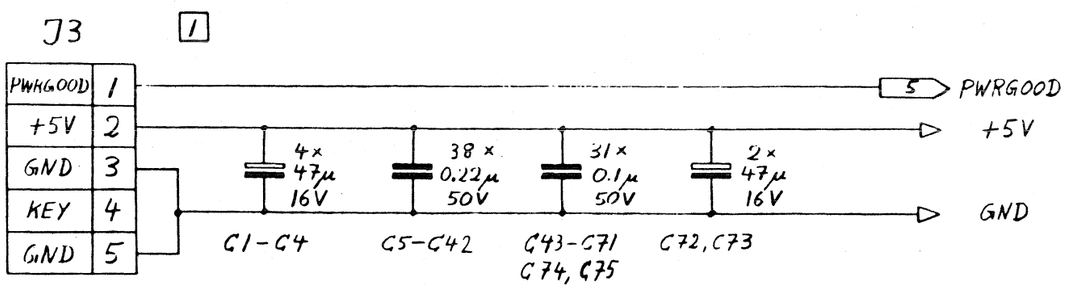
VIEW FROM COMPONENT SIDE

CPU-I/O-CONNECTOR I



VIEW FROM COMPONENT SIDE

CPU-POWER-CONNECTOR



1 J3 NOT USED ON DESKTOP VERSION

UNLESS OTHERWISE SPECIFIED TOLERANCES ON: DECIMALS .X ± .XX ± .XXX ± ∠'S ±	DRAWN BY: Farken	DATE 09-07-84	commodore
	CHKD:		SCHEMATIC CPU PCB 5
	ENGR: Wil	09-04-84	
	APPR:		
MATERIAL:	USED ON CBM-PC 10/20	NEXT ASSY	SIZE C 320400 REV J
FINISH:			SCALE NONE SHEET 5 OF 5

REVISIONS				
LTR	ZONE	DESCRIPTION	DATE	APPROVED

J6
KEYBOARD
KBCLK
KBDATA
KRESET
KBGND
KB+5V
CHASSIS GND
KEY
+5V
R1 R2 R3
3 x 2K2
U6
1/4 74LS125
2/2 74LS74
U1
PR D Q CLR
NC
1/2 74LS74
U4
KBINT
IRQ 1
U10
74LS299
SR SL S0 S1 CLR OE1 OE2
Q0 Q1 Q2 Q3 Q4 Q5 Q6 Q7
U7
1/6 74LS04
HLDKBCLK
KBCLK
ENBKB
KBCS
PRNSCS
U19
74LS02
XRESET
PRINTER J10
U14
74LS374
D Q OE
DATA 0
DATA 7
BUSY
ACK
PE
SLCT
ERROR
STROBE
AUTO FEED
INIT
SLCT IN
U11
U15
74LS125
D7
D6
D5
D4
D3
PRNINT
IRQ 7
PRNDCS
R5
2K2
U13
74LS175
1D 2D 3D 4D CLR
1Q 2Q 3Q 4Q
PRNCCS
R4
2K2
1/2 74LS74
U26
74LS245
A B DIR OE
D0
RESET
D0-7
PRNRB

DRAWN BY: Fouke	DATE: 89-07-19	commodore	
CHKD:	89-10-18	SCHEMATIC I/O PC3	
ENGR:	89-11-15		
APPR:			
MATERIAL:	USED ON: CBM-PC DESKTOP VERSION	SIZE: C	380404 REV: K
FINISH:	NEXT ASSY	SCALE NONE	SHEET 6 OF 4

REVISIONS				
LTR	ZONE	DESCRIPTION	DATE	APPROVED

BA0-19 4
XRESET 4
ACICS 4
DAF0-7 3
IORC 4
IOWC 4
XCLK 4
SPEAKER 4
POWER ON LED
SPEAKER
8Ω 0.2W
R14 220
R15 33
R16 1K2
T2 BC 337
R6 4K7
R7 1M
C36 22p
C37 47p
Q2 1.8432 MHz
R8 33
J8
J7
+5V
U23
ACI 8250
BA0 28 A0
BA1 27 A1
BA2 26 A2
35 MR
12 CS0
13 CS1
14 CS2
25 ADS
22 DISTR
19 DOSTR
16 XTAL1
17 XTAL2
DAF0 1 D0
2 D1
3 D2
4 D3
5 D4
6 D5
7 D6
DAF7 8 D7
21 DISTR
18 DOSTR
38 DCD
37 DSR
36 CTS
39 RI
10 SIN
9 RCLK
34 OUT1 NC
31 OUT2
30 INTRPT
24 CSOUT NC
23 DDIS NC
29 NC
15 BAUD OUT
20
R9 2K2
U15 1/4 74LS125
ACINT
JU3 JU2 JU1
ACIOPT 4
IRQ3 4
IRQ4 4
U27 74LS00
U7 1/6 74LS04
U28 74LS 74
U7 13 12 NC 74LS04
R10 4K7
D2 D3 2×IN4001
J5
33 DTR
32 RTS
11 SOUT
EIA DTR 6 9
EIA DCD
EIA RTS 7 10
EIA DSR
EIA TXD 8 11
EIA CTS
KEY 2
EIA RXD 12
CHASSIS GND 1
SIG GND 13 5
EIA RI
RS232
U25 MC 1488
NC 2 3 NC 7
U24 MC 1489
NC 2 1 3
NC 5 4 6
NC 9 10 8
NC 12 13 11 7
+5V 14
R12 2K2
R11 2K2
D1 IN4148
R13 10K
T1 BC 337

UNLESS OTHERWISE SPECIFIED TOLERANCES ON: DECIMALS .X ±.1 .XX ±.01 .XXX ±.005 ∠ ±1°	DRAWN BY: Forkan	DATE 09-17-84	commodore	
	CHKD:		SCHEMATIC I/O PCB	7
	ENGR:			
	APPR:			
MATERIAL:	USED ON CBM-PC DESKTOP VERSION	NEXT ASSY	SIZE C 380404	REV K
FINISH:			SCALE NONE	SHEET 2 OF 4

REVISIONS				
LTR	ZONE	DESCRIPTION	DATE	APPROVED

U2 1/2 74LS629 — +5V, RANGE, FC, EN, CEX, CEX, Y, Q1 8MHz

U9 74LS163 — +5V, R13 2K2, CLR, LD, ET, EP, D, C, B, A, QD, QC, QB, QA, RC

TC, 2/4 74LS02, U19

DACK2, BA0-19, FDCCS, IOWC, IORC

U12 FDC µPD765A — RDW, FLT/TRØ, RDD, WP/TS, IDX, CLK, WCK, RDY, TC, DACK, AØ, CS, WR, RD, DBØ, DB7, RESET, GND, INT, DRQ, FR/STP, RW/SEEK, LGT/DIR, WRENA, PSØ, PS1, VCO, MFM, USI, USØ, HDL, WRDATA, HEAD

U22 74LS245 — DIR, DØ, D7, DAFØ, DAF7, OE, DAFEN

U21 74LS174 — D2, D7, DØ-7, FCPCS, RESET, CLR

U7 1/6 74LS04

U13 2/4 74LS02 — R20 2K2

U16 1/6 74LS14

U17 1/4 7438

U8 74LS175 — CLR, 1D, 1Q, 2D, 2Q, 3D, 3Q, 4D, 4Q, NC

R21 1K

U6 1/4 74LS125

U5 74LS175

R30 2K2

U20 1/4 7438

U28 1/2 74LS74

T3 BC337 — R17 10K

U3 WD1691 — VCO, RDD, WDIN, RCLK, VCC, VSS, Ø1, Ø2, Ø3, Ø4, PU, PD, TG43, W6, EARLY, LATE, VFO/WF, DDEN, STB, NC, WDOUT

U18 4/4 7438

U16 4/6 74LS14 — R22 470, C40 680p

U11 2/4 74LS125 — FDCINT

R31 R32 R33 R34 4×220

R35 R36 R37 R38 4×330

R23 2K2

L1 100µH, C61 0.22µ 50V

R25 1K, P1 2K2, R27 82k, R28 68, C1 0.68, R29 47k, R26 1K5, C60 0.22µ 50V, C41 82p

1/4 74LS629 U2

RA1 R-PACK 8×2K2

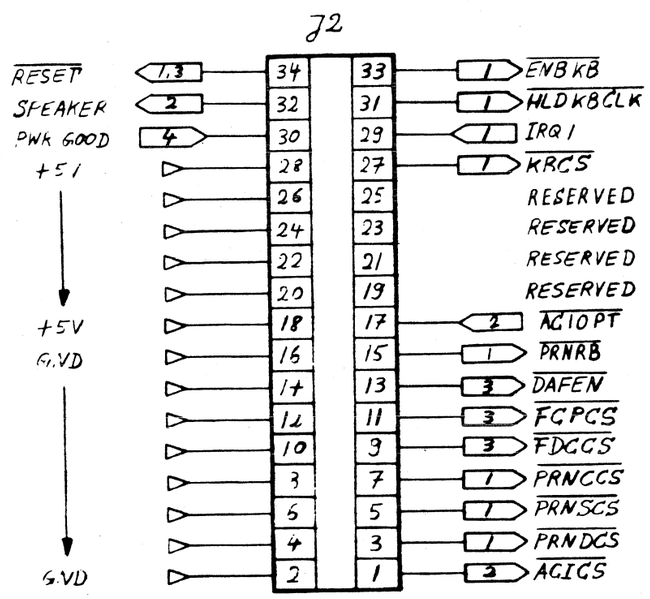
J4 FLOPPY — INDEX, WRPROTECT, TRACKØØ, READDATA, STEP, DIR, ALL ODD PINS ARE GROUNDED, WRDATA, WRG, SIDE1, DRVSEL1, DRVSEL2, DRVSEL3, DRVSEL4

KBCLK, DREQ2, IRQ6, DAFØ-7

DRAWN BY: Fraxx	DATE 89-07-04	commodore	
CHKD: SCH	89-10-04	SCHEMATIC I/O PC3 8	
ENGR: MK	89-07-14		
APPR:			
MATERIAL:	USED ON: CBM-PC DESKTOP VERSION	NEXT ASSY	SIZE C, 380404, REV K
FINISH:			SCALE NONE, SHEET 3 OF 4

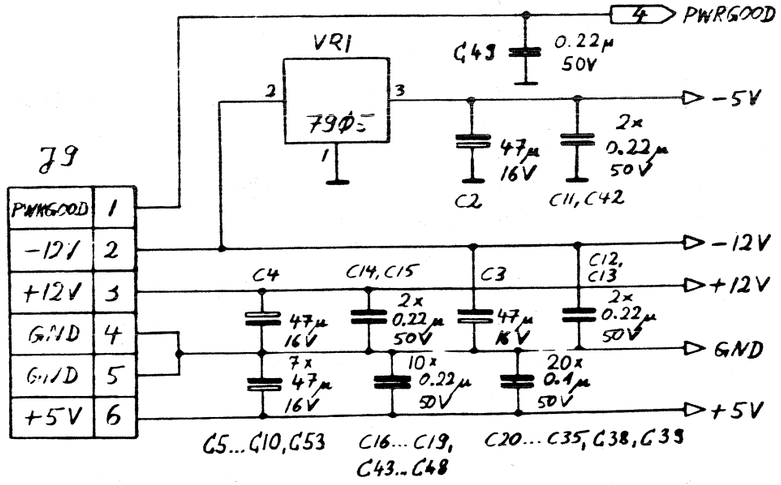
REVISIONS				
LTR	ZONE	DESCRIPTION	DATE	APPROVED

CPU-I/O-CONNECTOR II

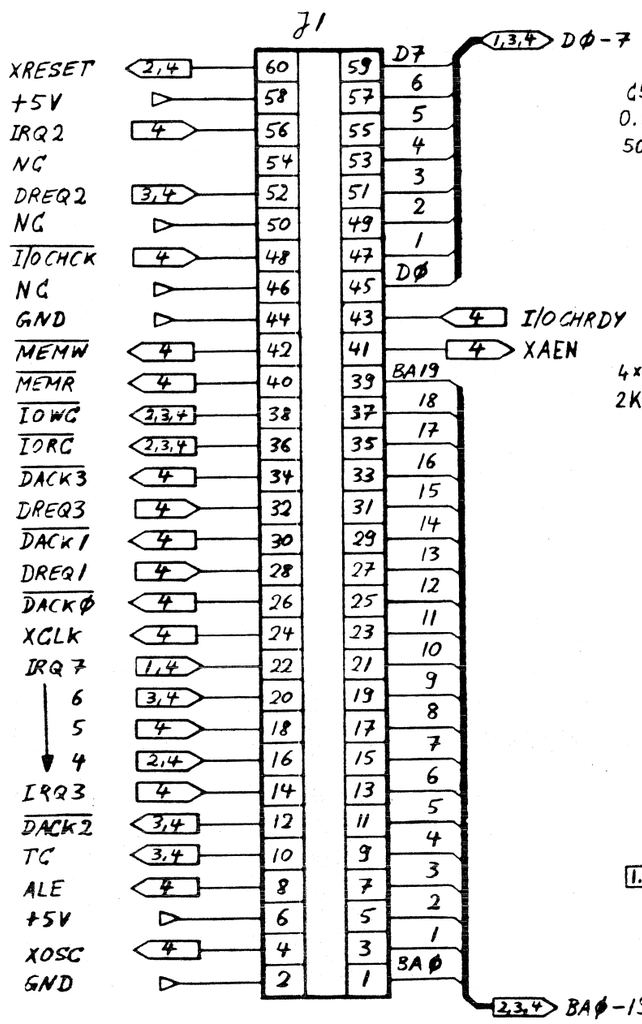


VIEW FROM SOLDER SIDE

I/O-POWER-CONNECTOR/-5V SUPPLY

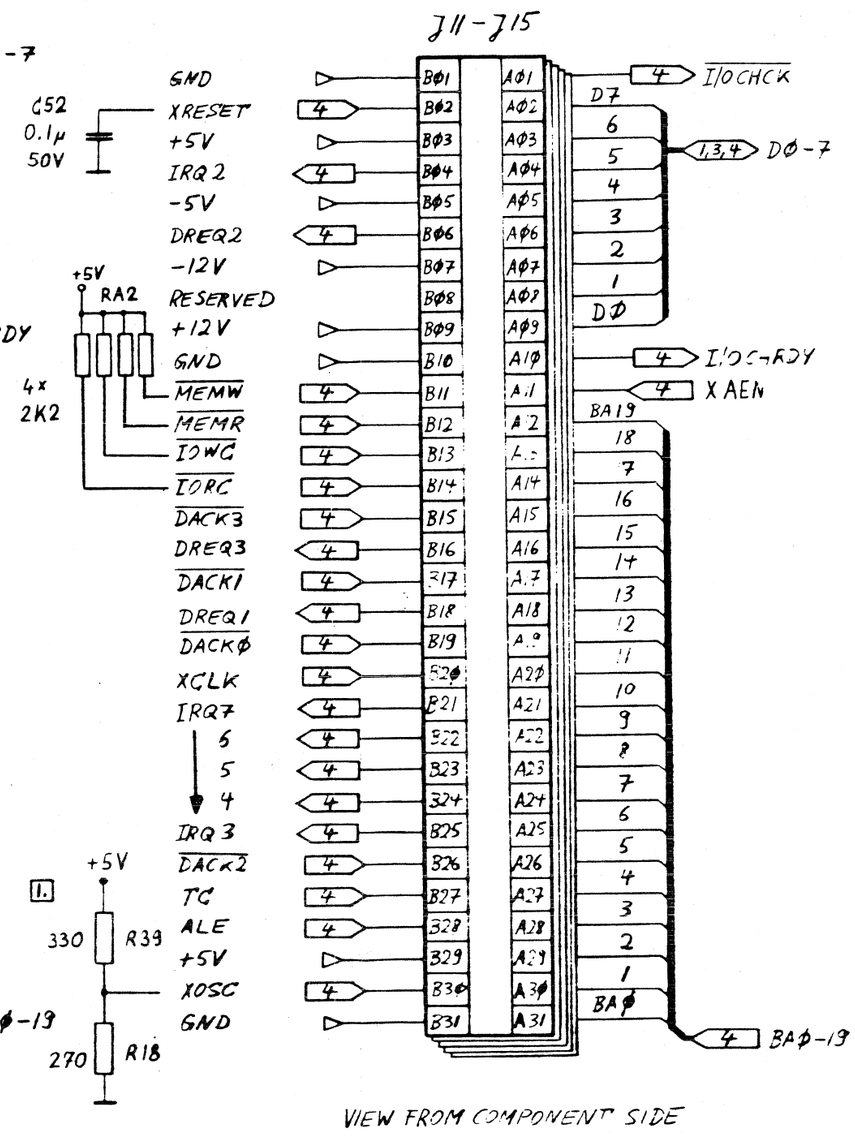


CPU-I/O-CONNECTOR I



VIEW FROM SOLDER SIDE

I/O-EXPANSION-CONNECTOR (5x)



VIEW FROM COMPONENT SIDE

1. R39 AND R18 IF NECESSARY

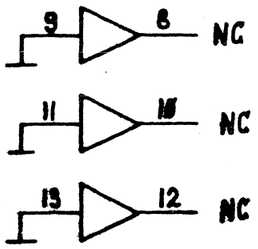
NOTES UNLESS OTHERWISE SPECIFIED

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES; TOLERANCES ON: DECIMALS .X ±.1, .XX ±.01, .XXX ±.005, ANGLES ±1°; MATERIAL: ; FINISH:	DRAWN BY: Fyken	DATE 09-07-84	commodore
	CHKD:	10-10-84	SCHEMATIC I/O PCB 9
	ENGR:	09-27-84	
	APPR:		
	USED ON: CBM-PC DESKTOP VERSION	NEXT ASSY	SIZE C — 380-04 — REV K
			SCALE NONE — SHEET 4 OF 4

SPARES:

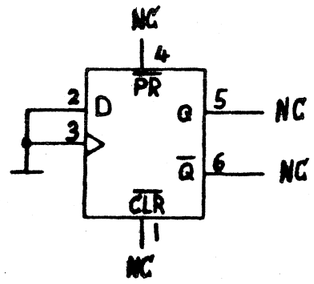
U3

3/6 7407



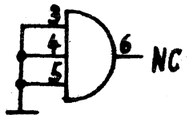
U69

½ 74LS74



U31

⅓ 74LS11



REVISIONS

LTR	ZONE	DESCRIPTION	DATE	APPROVED
ϕ		ADVANCED ENGINEERING RELEASE	09-13-85	
1		UPDATE	10-1-85	
2		UPDATE	10-17-85	
3		UPDATE	11-05-85	
4		PILOT PRODUCTION RELEASE	11-14-85	SL

UNLESS OTHERWISE SPECIFIED
TOLERANCES ON:
DECIMALS
X ± .XX ± .XXX ± ∠ ±

MATERIAL:

FINISH:

		DATE
DRAWN BY:	M. Hittmann	09-12-85
CHKD:		
ENGR:		11-14-85
APPR:	SL	11-14-85

USED ON: PC 10/20

NEXT ASSY:

commodore

SCHEMATIC 10
COMBINED MAINBOARD

SIZE B | 380504 | REV 4

SCALE | SHEET 1 OF 9

1715 Gebr. Widmann

REVISIONS				
LTR	ZONE	DESCRIPTION	DATE	APPROVED
		SEE SHEET 1		

NMI 5
INTR 3
PWRGOOD 9
I/O CHRDY 9
DACKØ 5
DMSDET 5
NRQ 3

U53 8284A
C53 0.22µ
R1 33
R2 33
R3 33
TR 2-40p
Q1 14.31818 MHz
R31 510
R32 820
RP3 8x2K2
RU1
RU2
RU3
RU4
NC
RU6

U45 1/6 74LSØ4
U44 1/4 74LSØ2
U46
U47 74S74
U37 74SØØ
U54 2/3 74ALS11
74LS175
U44 74LSØ2
U47 74S74
U45 1/6 74LSØ4

RESET
RESET
PCLK
OSC
CLK
DMACLK
DMARDY
DMAAEN
HLDA

U50 8088
C50 0.22µ
C49 0.22µ
U49 8087
RU2
RU3
RU4

AEN
AEN

U48 8288
C48 0.22µ
R4 33
U56 74LS245
U45 74LSØ4
C56 0.22µ

NPINT
MEMR
MEMW
IORC
IOWC
INTA
ALE
DØ-7

U55 74LS373
U51 1/2 74LS244
U52 74LS373

BAØ-19

REVISIONS				
LTR	ZONE	DESCRIPTION	DATE	APPROVED

+5V

DBDIR 5

IRQ1 6 KBINT
IRQ2 8
IRQ3 8
IRQ4 8 ACIINT
IRQ5 8
IRQ6 8 FDCINT
IRQ7 6 PRNINT
INTA 2

PGCCS 5

TMR2GATE 5

PCLK 2

TMRCS 5

BIOWC 9

BAEN 4

D0-7 2

BAEN 4

XRESET 9

1/2 74LS74 U11 — UPU2

1/4 74LS08 U6

4K7 R5

U15 8259A
IR0 IR1 IR2 IR3 IR4 IR5 IR6 IR7 INTA A0 CS RD WR CAS0 CAS1 CAS2 SP/EN INT D7-D0 VCC GND
MC MC

0.22µ C15

U16 8253A-5
GATE0 GATE1 GATE2 CLK0 CLK1 CLK2 A0 A1 CS RD WR GND
OUT0 OUT1 OUT2 D7-D0

0.22µ C16

U35 1/4 74 HCT 32

4K7 RP2

U21 74LS245
A B DIR OE

2×4K7 1/4 RP11

PGCS 5

INTR 2

D0-7 5

TMR2 5

1/8 RP2 2K2

UPU2 3

DMAAEN 2

U11 1/2 74LS74
PR D CLR Q
DREQ0
DACK0 3

DREQ1 9
DREQ2 8
DREQ3 9

DMACLK 2
DMAKDY 2
HLDA 2
DMACS 5

0.22µ C14

U14 8237A-5
VCC DRQ0 DRQ1 DRQ2 DRQ3 D7-D0 CLK READY HLDA CS RESET GND
ADSTB AEN A7 A6 A5 A4 A3 A2 A1 A0 IOR IOW MEMR MEMW PIN5
DACK0 DACK1 DACK2 DACK3 HRQ EOP

U12 74LS670
WA WB GW RA RB GR D1 D2 D3 D4 Q1 Q2 Q3 Q4
BA19 BA18 BA17 BA16

U13 74LS373
D Q OE G
BA15 BA14 BA13 BA12 BA11 BA10 BA9 BA8

U17
A Q OE
BA7 BA6 BA5 BA4

1/2 74LS244

U18 74LS245
B A DIR OE
BA3 BA2 BA1 BA0

1/8 RP2 2K2

IORC IOWC MEMR MEMW

DACK0 DACK1 DACK2 DACK3 HRQ TC

U2 74 LS 04
TC

BA0-19

UNLESS OTHERWISE SPECIFIED TOLERANCED ON: DECIMALS .X ±.1 .XX ±.01 .XXX ±.005 ∠ ±1°	DRAWN BY: W. Hitchcock	DATE 09-06-85	commodore
	CHKD: Ragusa	09-05-85	SCHEMATIC 12
	ENGR: Wang	9-14-85	COMBINED MAINBOARD
	APPR:		
MATERIAL:	USED ON PC10/20 COMB	NEXT ASSY	SIZE C 380504 REV 4
FINISH:			SCALE NONE SHEET 3 OF 9

REVISIONS				
LTR	ZONE	DESCRIPTION	DATE	APPROVED
		SEE SHEET 1		

[1] FOR 27128 AND 23128 :
JA3, JA5, JA7 CLOSED

BA0-19 (2)

+5V C32 0.22µ — U32 74HCT158 — RA1 R-PACK 4x33Ω — BA0 BA4 BA11 — MA0 MA3

+5V C33 0.22µ — U33 74HCT158 — RA2 — BA4 BA15 — MA4 MA7

BA17 — 1/6 74LS04 U2 — BA16 — U37 3/4 74S00 — 1/4 RA3 — MA8

3/4 RA3 R-PACK 4x33Ω

U38 82S153 — +5V C38 0.22µ — BA19 BA18 BA17 BA16 — RAS0 RAS1 RAS2 RAS3 — RAS1-3

R8 2K2 — SW3 — RAMEXT DACK0

C36 0.22µ — U36 (DELAY-LINE) IN VCC 50ns 100ns GND

U45 1/6 74LS04 — AEN

U31 1/3 74LS11 — BMEMR BMEMW ENRAMPCK

U35 2/4 74HCT32 — 1/4 74LS08 U6 — U35 1/4 74HCT32

BANK0 — U22 U23 U24 U25 U26 U27 U28 U29 U30 — MA0-8 — MA0 MA1 MA2 MA3 MA4 MA5 MA6 MA7 MA8 — RAS CAS WE — MD0 MD1 MD2 MD3 MD4 MD5 MD6 MD7

VCC +5V — 9x 0.22µ C22-C30 — GND — 9x D-RAM 256K x1

PDI PDO

BA13 — U41 27128/23128 [1] — C41 0.22µ +5V — VCC VPP PGM A13 GND — JA3 JA4 — BA0 BA1 BA2 BA3 BA4 BA5 BA6 BA7 BA8 BA9 BA10 BA11 BA12 — JA5 JA6 JA7 JA8 — A0 A1 A2 A3 A4 A5 A6 A7 A8 A9 A10 A11 A12 CE OE — D0 D1 D2 D3 D4 D5 D6 D7 — MD0 MD7

D0-7 (2) — U42 74LS245 — DIR OE — A MD0 MD1 MD2 MD3 MD4 MD5 MD6 MD7 — B D0 D1 D2 D3 D4 D5 D6 D7

WE CAS MD0-7

+5V C34 0.22µ — U34 74S280 — MD0 MD1 MD2 MD3 MD4 MD5 MD6 MD7 — NC NC EVEN ODD

U1 1/2 74LS74 — D PR Q CLR — PCK PCK

BAEN (3.5)

UNLESS OTHERWISE SPECIFIED	DRAWN BY: W. Bittmann	DATE 09-06-85	commodore
TOLERANCES ON: DECIMALS .X ± .XX ± .XXX ± ∠ ±	CHKD:		SCHEMATIC 13
	ENGR:	11-14-85	COMBINED MAINBOARD
	APPR: SL	11-14-85	
MATERIAL:	USED ON C8M PC10/20	NEXT ASSY	SIZE C — 380504 — REV 4
FINISH:			SCALE NONE — SHEET 4 OF 9

REVISIONS				
LTR	ZONE	DESCRIPTION	DATE	APPROVED
		SEE SHEET 1		

RP1 R-PACK 8x 2k2 — +5V

SW — SW1 … SW8 — SW3

U20 74LS257 — DB0 … DB3

U6 ¼ 74LS08

U19 ¼ 74LS367 — DB4 … DB7

U5 ½ 74LS74 — U2 ¼ 74LS04 — U31 ¼ 74LS11 — U44 ¼ 74LS02

U1 ½ 74LS74 — U8 74LS273 — U9 74LS244

U40 N82S100 FPLA 1 — U7 74LS155 — U39 N82S100 FPLA 2 — U54 ⅓ 74ALS11

J14

R62CS, NPINT, TMR2, PCK, IIOCHCK, PCK, UPU2, NMICS, RESET, W61CS, R61CS, DB0-7, ACINT, DACK2

SPEAKER, NMI, ENRAMPCK, ENBKB, HLDKBCLK, TMR2GATE

BA0-19, BREN, BIORC, BIOWC, BMEMR, WSDET, TMRCS, PICCS, DBDIR, DMACS, KBCS, R61CS, R62CS, NC, PGCS, W61CS, NMICS, NC, FDCCS, FCPCS, ACICS, PRNDW, PRNDR, PRNSCS, PRNCCS, DAFEN, DACK25, IRQ4, IRQ3

NOTES: [I] DISABLE FDC : OPEN J14 (11,12) & CLOSE J14 (9,10)
SWITCH PRINTER BASE ADDRESS TO 3BC HEX : CLOSE J14 (7,8)
SWITCH ACIA BASE ADDRESS TO 2F8 HEX : CLOSE J14 (5,6) & J14 (3,4) — OPEN J14 (1,2)

UNLESS OTHERWISE SPECIFIED — TOLERANCES ON: DECIMALS .X ±, .XX ±, .XXX ±, ∠ ±°

DRAWN BY: W. Gilliam	DATE: 09-12-85	commodore
CHKD:		SCHEMATIC 14
ENGR:	11-4-85	COMBINED MAINBOARD
APPR:	11-15-85	
MATERIAL:	USED ON: CBM PC10/20	NEXT ASSY
FINISH:		SIZE C · 380 504 · REV 4
		SCALE NONE · SHEET 5 OF 9

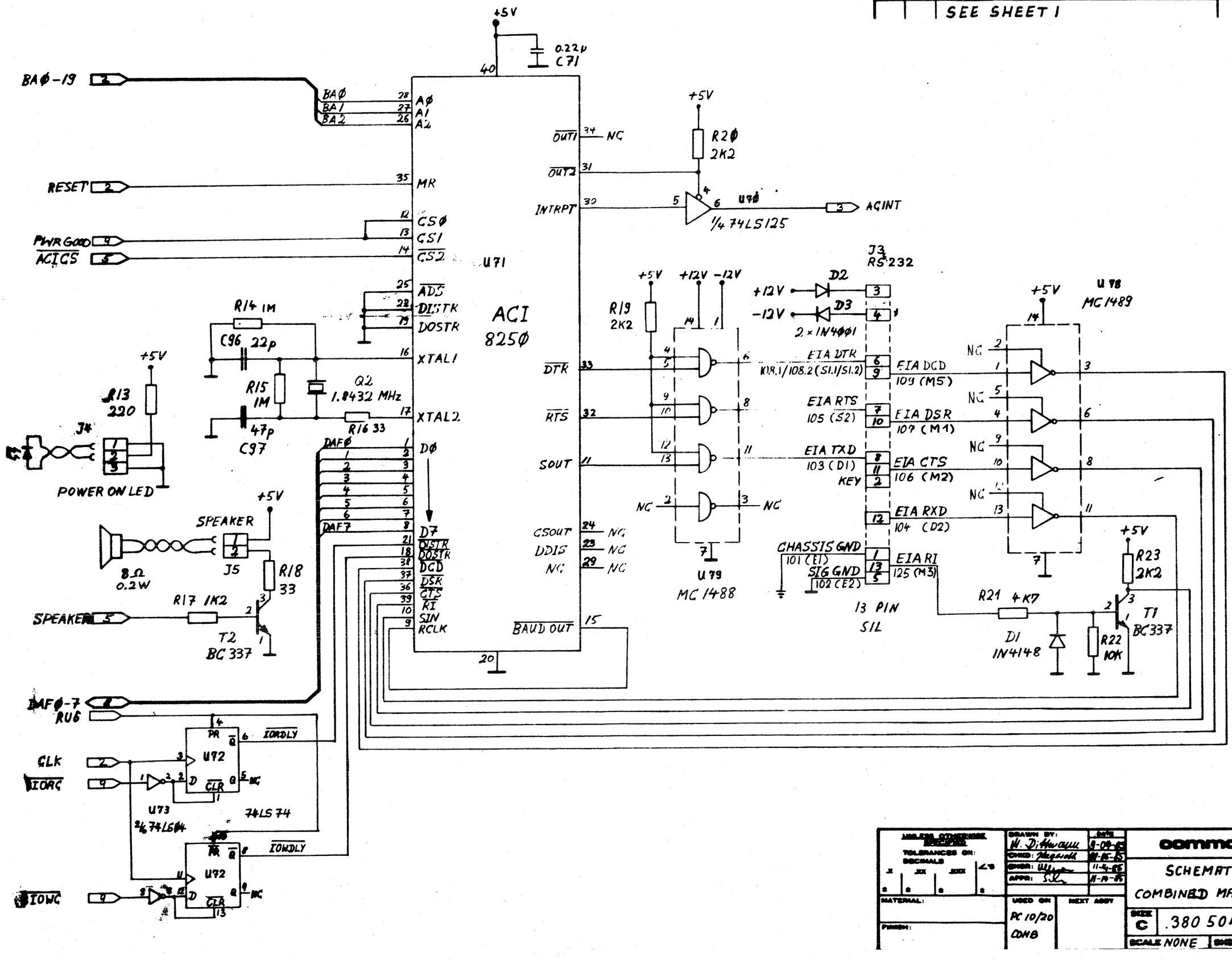
REVISIONS				
LTR	ZONE	DESCRIPTION	DATE	APPROVED
		SEE SHEET 1		

J1
KEYBOARD
KBCLK
KBDATA
KBRESET
KBGND
KB+5V
KEY
NC
C80 0.22µ
+5V
C81 C82 C83
3 x 100 pF
+5V
4/8 RP2
2K2
7407
U3
HLDKBCLK 5
PCLK 4
ENBKB 5
KBCS 5
PRNSCS 5
RESET 2
PRNDW 5
DAF 0-7 8
PRNDR 8
2/2 74LS74
U4
PR D Q CLR
1/2 74LS74
U5
U2
1/6 74LSØ4
KBINT
3 IRQ 1
U18
74LS299
SL SØ SR SI CLR G1 G2
QA QB QC QD QE QF QG QH
QA' QH'
NC
D7 D6 D5 D4 D3 D2 D1 DØ
5 DB Ø-7
U8
7407
U77
74LS374
DØ D1 D2 D3 D4 D5 D6 D7
OE
PRINTER
J2
DATA Ø
DATA 7
C84 . . . . . C91
8 x 100 pF
BUSY
ACK
PE
SLCT
ERROR
STROBE
AUTO FDXT
INIT
SLCT IN
C92 . . C95
4 x 100 pF
25 PIN
SUB-D
U74
74175
1D 2D 3D 4D CLR
1Q 1Q 2Q 2Q 3Q 3Q 4Q 4Q
NC
U69
2K2
1/4 74LS94
U76
74LS244
A Y G1 G2
R12
2K2
+5V
U73
1/6 74LSØ4
U75
74LS365
A1 A2 A3 A4 A5 A6
Y1 Y2 Y3 Y4 Y5 Y6 NC
G1 G2
D7 D6 D5 D4 D3
U73
1/6 74LSØ4
74LS 125
U70
PRINT
5 IRQ 7
PRNGCS 5
URU 2 3
RESET 2

NOTES: 1. C84-C91 ONLY IF REQUIRED
2. C92-C95 ONLY IF REQUIRED

UNLESS OTHERWISE SPECIFIED TOLERANCES ON: DECIMALS .X .XX .XXX ∠ ±	DRAWN BY: J. Williams	DATE 09-09-85	commodore
	CHKD: Margolis	10-05-85	SCHEMATIC 15
	ENGR: Williams	11-14-85	COMBINED MAIN BOARD
	APPR: Gil	11-14-85	
MATERIAL:	USED ON PC 10/20 COMB	NEXT ASSY	SIZE C 380504
FINISH:			SCALE NONE SHEET 6

REVISIONS				
LTR	ZONE	DESCRIPTION	DATE	APPROVED
		SEE SHEET 1		



UNLESS OTHERWISE SPECIFIED: TOLERANCES ON: DECIMALS X .1 XX .01 XXX .005 ∠ 1°	DRAWN BY: W. Dittmann	DATE 8-08-85	commodore
	CHKD: Mayerhofer	11-8-85	SCHEMATIC 16
	ENGR: Wu	11-8-85	COMBINED MAINBOARD
	APPR: SVL	11-11-85	
MATERIAL:	USED ON PC 10/20 COMB	NEXT ASSY	SIZE C .380 504
FINISH:			SCALE NONE SHEET 7 OF 9

REVISIONS				
LTR	ZONE	DESCRIPTION	DATE	APPROVED

U59 ½ 74LS629 — RANGE, FC, EN, CEX, CEX, Y; Q3 8MHz

U57 74LS163 — LD, ET, EP, D, C, B, A, CLR; QD, QC, QB, QA, RC; PU0

U64 FDC µPD765A — RDW, CLK, WCK, RDY, TC, DACK, A0, CS, WR, RD, RESET; DRQ, INT, IDX, WP/TS, RDD, FLT/TRK0, WRDATA, RW/SEEK, MFM, US0, US1, HDL, PS0, PS1, VCO, WRENA, FR/STP, LCT/DIR, HEAD; DB0-7; VCC +5V, GND

U58 74LS175 — CLR, 1D, 2D, 3D, 4D; 1Q, 2Q, 3Q, 4Q; NC

U70 ¼ 74LS125 — DREQ2, IRQ6, IREN

RP4 R-PACK — 4×220 — +5V, INDEX, WRPROTECT, TRACK00, READDATA, 4×330, KEY, NC

FLOPPY 76

U65 ⅙ 74LS14 — FLT/TRK0, RW/SEEK

U66 ¼ 7438 — WG, DDEN, VFO/WF, IREN

U73 ⅙ 74LS04 — RW/SEEK

U62 ½ 74LS123 — B, A, Q, RCE, CEX, CLR; NC

U61 74LS175 — 1D, 2D, 3D, 4D; 1Q, 2Q, 3Q, 4Q; CLR; NC

U60 WD 1691 — WDIN, RCLK, RDD, PU, PD, VSS, VCO, STB, WDOUT; Φ1, Φ4; T643, EARLY, LATE, VFO/WF, WG, DDEN

U62 ½ 74LS123 — Q, B, CEX, RCE, CLR, A

L1 100µH; C100 0.22µ 50V; C98 0.68µ; C99 0.22µ 50V; C59 0.22µ 50V; C101 150p; R26 82K; R28 2K2; R24 68; R25 47K; R33 2K2; C102 82p; R28 8K2

U59 ½ 74LS629 — RANGE, FC, EN, GND, Y, CEX, CEX; VCC

RP5 R-PACK 8×2K2 — +5V; 3 4 5 2 8 7 6 9 — WRDATA, WRG, STEP, DIR, SIDE1, DRVSEL1, DRVSEL2, DRVSEL3, DRVSEL4

U68 7438; U67 7438

J16 3 2 1 — +5V

RP6 R-PACK 8×2K2 — +5V; PU0, PU1, PU2, PU3, PU4, PU5, PU6, PU7

U45 ¼ 74LS04; U43 74LS245 — DIR, OE; D0-7, DAF0-7, DAFEN

U44 ¼ 74LS02 — TC, DACK25, DACK

U63 74LS174 — D, CLR; Q; DAF2, DAF7; FCPCS, RESET

U65 ⅙ 74LS14

U66 ¼ 7438

C64 0.22µ

ALL ODD PINS ARE GROUNDED

NOTE: 1. J16 ONLY IF REQUIRED

UNLESS OTHERWISE SPECIFIED TOLERANCES ON: DECIMALS .X ±, .XX ±, .XXX ±, ∠'S ±	DRAWN BY: K...	DATE 09-13-85	commodore
	CHKD:		SCHEMATIC 17
	ENGR: ...	11-14-85	COMBINED MAIN BOARD
	APPR: ...	1-4-85	
MATERIAL:	USED ON PC 10/20 COMBI	NEXT ASSY	SIZE C — 380504 — REV 4
FINISH:			SCALE NONE — SHEET 8 OF 9

REVISIONS				
LTR	ZONE	DESCRIPTION	DATE	APPROVED
		SEE SHEET 1		

U17 ½ 74LS244

+5V

½ RP11 4x4K7

$\overline{BMEMW}$ $\overline{BMEMR}$ $\overline{BIOWC}$ $\overline{BIORC}$

J8 - 12

RP7 8 x 330 OHM

C107 C108 C109 C110 C111 C112 C113 C114 8 x 1000pF

$\overline{I/OCHCK}$

D7 D6 D5 D4 D3 D2 D1 D0 — D0-7

x RESET

C146 0.22µ

+5V

IRQ2 C161 Cx

-5V

DREQ2 C162 Cx

-12V

RESERVED

+12V

½ RP8 4 x 330 OHM

C103 C104 C105 C106 4 x 1000pF

$\overline{I/OCHRDY}$

BA0-19

XAEN

RA4 4 x 33Ω

MEMW MEMR IOWC IORC

$\overline{DACK3}$ DREQ3 C163 Cx

$\overline{DACK1}$ DREQ1 C164 Cx

½ RP8 4 x 330 OHM

RP9 8 x 330 OHM

RP10 8 x 330 OHM

20 x 1000 pF

Cx = 100pF

33R R29 XCLK

IRQ7 C165 Cx

IRQ6 C166 Cx

IRQ5 C167 Cx

IRQ4 C168 Cx

IRQ3 C169 Cx

U19 ¾ 74LS367

$\overline{DACK0}$ $\overline{DACK2}$

TC ALE +5V

33R R30 XOSC

U51 ½ 74LS244

RESET CLK OSC AEN

$\overline{XRESET}$

VIEW FROM COMPONENT SIDE

NOTES: ◫ C103 - C106 ONLY IF REQUIRED

J13

RAM-EXPANSION-CONNECTOR

MD0	1	2	
MD2	3	4	MD1
MD4	5	6	MD3
MD6	7	8	MD5
PDI	9	10	MD7
	11	12	PDO
MA0	13	14	
MA2	15	16	MA1
MA4	17	18	MA3
WE	19	20	MA5
MA6	21	22	MA7
RAMEXT	23	24	MA8
CAS	25	26	
RAS1	27	28	RAS2
	29	30	RAS3
+5V	31	32	
	33	34	+5V

I/O-POWER-CONNECTOR / -5V SUPPLY

PWR GOOD

0,22µF 50V C115

VR1 7905 — 47µF 16V C149 — 0.22µF 50V C116 — - 5V

C159, C160

J7

PWRGOOD	1
-12V	2
+12V	3
GND	4
GND	5
+5V	6

C124 C125 — C147 C148 — - 12 V, + 12 V

C150 47µF 16V — C117 0.22µF 50V — C151 47µF 16V — C118 0.22µF 50V — GND

47µF 16V — 0.22µF 50V — 0.1µF 50V — +5V

C152 - C157, C172, C173

C119 - C123, C170, C171, C158

C1 - C6, C11 - C13, C17 - C21, C31, 35, 37, 42-44, 46, 47, C51, 52, 54, 55, 58, 61, C66 - 70, 73, 77, 78

UNLESS OTHERWISE SPECIFIED TOLERANCES ON: DECIMALS .X ± .XX ± .XXX ± ∠° ±	DRAWN BY: W. Hauam	DATE 09-13-85	commodore
	CHKD:		SCHEMATIC 18 COMBINED MAINBOARD
	ENGR:	11-14-86	
	APPR:	11-14-85	
MATERIAL:	USED ON PC10/20	NEXT ASSY	SIZE C — 380 504 — REV 4
FINISH:			SCALE — SHEET 9 OF 9

REVISIONS				
LTR	ZONE	DESCRIPTION	DATE	APPROVED
		SEE SHEET 1		

RAM EXPANSION CONNECTOR

34 Pin

J1

15 MA0
16 MA1
17 MA2
18 MA3
19 MA4
20 MA5
23 MA6
22 MA7
24 MA8
29 RAS1
27 CAS
21 WE
3 MD0
4 MD1
5 MD2
6 MD3
7 MD4
8 MD5
9 MD6
10 MD7
11 PDI
12 PDO
31 +5V
32 +5V
34 +5V
33
1 GND
2 GND
13 GND
14 GND
26
28 RAS2
30 RAS3
25 RAMEXT

1/2 R.-PACK RA1
4 x 33 Ω
R1 33 Ω

C16
47µ
16V

1/2 R.-PACK RA1

9 x 256 K x 1 DRAM
U1 - U9

MA0 5 → A0
MA1 7 → A1
MA2 6 → A2
MA3 12 → A3
MA4 11 → A4
MA5 10 → A5
MA6 13 → A6
MA7 9 → A7
MA8 1 → A8
4 → RAS
15 → CAS
3 → WE
DI DO

VCC 8 → +5V
9 x 0.22µ
C1 - C9
GND 16

MD0 MD1 MD2 MD3 MD4 MD5 MD6 MD7

4 x 64K x 4 DRAM
U12 - U15

MA0 14 → A0
MA1 13 → A1
MA2 12 → A2
MA3 11 → A3
MA4 8 → A4
MA5 7 → A5
MA6 6 → A6
MA7 10 → A7
16 → CAS
4 → WE
1 → G
DQ1 DQ2 DQ3 DQ4

VCC 9 → +5V
GND 18
4 x 0.22µ
C12 - C15

2 x 64 K
x 1 DRAM
U10 - U11

5 → A0
7 → A1
6 → A2
12 → A3
11 → A4
10 → A5
13 → A6
9 → A7
15 → CAS
3 → WE
DI DO DI DO
NC 1 NC

VCC 8 → +5V
GND 16
2 x 0.22µF
C10 - C11

RAS

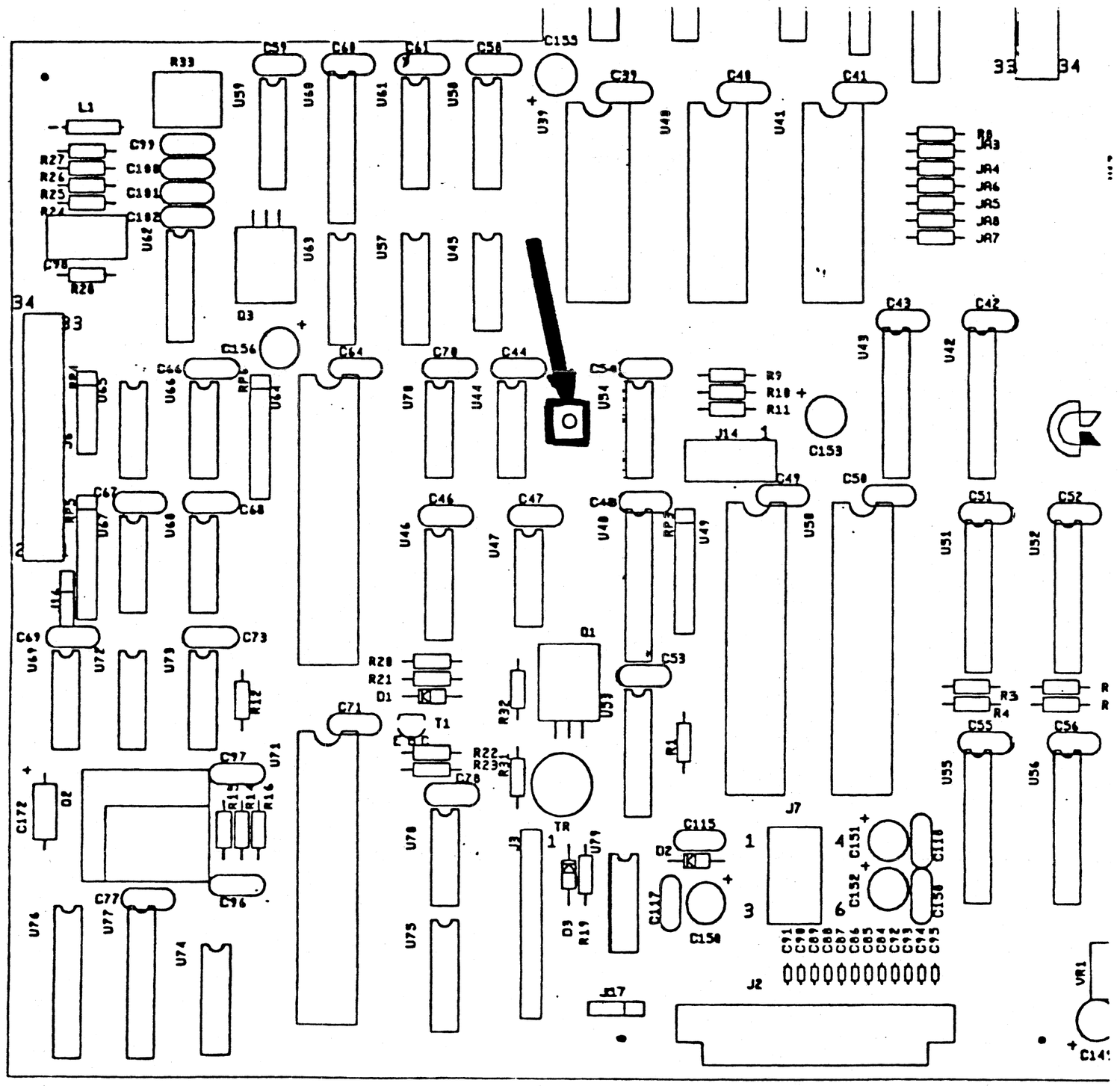
UNLESS OTHERWISE SPECIFIED	DRAWN BY: Hinz	DATE 10-09-85	commodore
TOLERANCES ON: DECIMALS .X ± .XX ± .XXX ± ∠ ±	CHKD:		RAM EXTENSION 19 CARD 384K BYTE
MATERIAL:	ENGR: Ullmer	11-27-85	SIZE C 380506 REV 1
FINISH:	APPR:		SCALE NONE SHEET OF
	USED ON PC10/20 Combined Board	NEXT ASSY	

MOUNTING THE NEW COMBINED BOARD INTO THE PC HOUSING

For the new PC COMBINED BOARD an additional metal stand-off is required at the mounting hole indicated by an arrow on the drawing below. At this location the PCB is locked by a screw. This is used to connect CHASSIS GND to the PCB.

At production start this stand-off will be welded at the bottom of the PC housing.

For mounting the PC COMBINED board into the existing PC housings, an appropriate metal stand-off can be provided, which can be fitted by a screw to the housing bottom, like done in this engineering sample.



SILKTOP

REVISIONS				
LTR	ZONE	DESCRIPTION	DATE	APPROVED

+5V
16.250 MHz
OSC
Y1
1/2 74S04
74LS162/163
U24
N.C.
U13
PAL
16R6
74LS00
74LS08
74LS11
82S100
VCC
U18
74LS74
TP
I/O READY
D0
D7
A0
A19
MEMW
MEMR
IOR
AEN
IOW
RESET
XCLK
GND
3 x 47µF/16V
22x 0.1µF
J1

DOT CLK
S/L
CCLK
WR
MUX/CLKD
OEI
WI
DATACLK
DATACLK
OEI
OSC
S/L
D0-7
A0-19
ENMONO
RMONO
READ MEM
6845CS
CONTROL
STATUS
WRITE MEM
IOW
RESET
6845E

commodore

SCHEMATIC 21
MONOCHROME VIDEO PCB

CBM-PC

C 380412 E

SCALE SHEET 1 OF 4

REVISIONS				
LTR	ZONE	DESCRIPTION	DATE	APPROVED

A0-19 1 — A0

MUX/CLKD 1

WRITEMEM 1

BD0-7 3

A1 A2 A3 A4 A5 A6 A7 A8 A9 A10 A11

U9 6545 CRTC
- BD0 BD1 BD2 BD3 BD4 BD5 BD6 BD7
- D0 D7
- VCC +5V (20)
- MA0 MA1 MA2 MA3 MA4 MA5 MA6 MA7 MA8 MA9 MA10 MA11 MA12 MA13
- NC (15 16 17)
- RA0 RA1 RA2 RA3 RA4
- CS RS Φ2 R/W CLK RESET LPSTB
- DISPEN CURSOR HSYNC VSYNC
- GND (1)

6845CS 1 — CS
6845E 1 — Φ2
10N 1 — R/W
CCLK 1 — CLK
RESET 1 — RESET

U16 U17 U26 74LS157
- MA0 MA1 MA2 MA3 MA4 MA5 MA6 MA7 MA8 MA9 MA10
- VA0 VA1 VA3 VA4 VA5 VA6 VA7 VA8 VA9 VA10
- S = 1, G = 15
- +5V (14)

WRITED 3

WI 1 — WE I
OEI 1 — OE I
WII 1 — WE II
OEII 1 — OE II

RA0-3 4

DATACLK 1

U5 U6 2016 RAM 2K×8
- A0 A1 A2 A3 A4 A5 A6 A7 A8 A9 A10
- D0 D1 D2 D3 D4 D5 D6 D7
- W OE CS
- VCC +5V (24)
- GND (12)

VD0-7 3,4

U12 74LS74
- 1D 2D 3D 4D
- 1Q 2Q 3Q 4Q
- CLR +5V (1)
- NC (11)

DISENDLY 4
CURDLY 4
CURDLY 4
HSDLY 3,4
VSDLY 4
CURBLINK 4
BLINK 4

1/2 74LS393
- U20 A CLR Q_A Q_B Q_C Q_D
- NC

ENBLINK 3

UNLESS OTHERWISE SPECIFIED TOLERANCES ON: DECIMALS .X ±.1 .XX ±.05 .XXX ±.010 ∠ ±1°	DRAWN BY: T. Chin	DATE 10-16-84	commodore
	CHKD: [illegible]	10-16-84	SCHEMATIC 22
	ENGR:		MONOCHROME VIDEO PCB
	APPR:		
MATERIAL:	USED ON CBM-PC	NEXT ASSY	SIZE C — 380 412 — REV E
FINISH:			SCALE NONE — SHEET 2 OF 4

REVISIONS				
LTR	ZONE	DESCRIPTION	DATE	APPROVED

VDØ-7 2

WRITED 2

RMONO 1

ENMONO 1

U8 — 74LS244

VDØ	18	2	BDØ
1	16	4	1
2	14	6	2
3	12	8	3
4	9	11	4
5	7	13	5
6	5	15	6
VD7	3	17	BD7
	1		$\overline{G1}$
	19		$\overline{G2}$

U29 — 74LS245

BDØ	18	2	DØ
1	17	3	1
2	16	4	2
3	15	5	3
4	14	6	4
5	13	7	5
6	12	8	6
BD7	11	9	D7
	1		DIR
	19		$\overline{G}$

1 DØ-7

U7 — 74LS374

VDØ	3	2	BDØ
1	4	5	1
2	7	6	2
3	8	9	3
4	13	12	4
5	14	15	5
6	17	16	6
VD7	18	19	BD7
	11		
	1		$\overline{OE}$

MUX/CLKD 1

READ MEM 1

RESET 1

CONTROL 1

U19 — ½74LS244

HSDLY	2	11	A
		13	
		15	
VIDEO	4	17	A
STATUS	1	19	$\overline{G2}$
		9	BDØ
		7	1
		5	2
		3	BD3

+5V

BD3 2

U23 — 74LS74

		4	PR
D	2	5	Q
	3		
$\overline{CLR}$	1	6	$\overline{Q}$

5 4 ENVID

6 N.C.

+5V

BD5

U23 — 74LS74

		10	PR
D	12	9	Q
	11		
$\overline{CLR}$	13	8	$\overline{Q}$

9 4 ENBLINK

8 2 $\overline{ENBLINK}$

2 BDØ-7

UNLESS OTHERWISE SPECIFIED
TOLERANCES ON:
DECIMALS
.X ±.1 .XX ±.01 .XXX ±.005 ∠ ±1°

DRAWN BY:	B. Gorny	9/16-84
CHKD:		10-16-84
ENGR:		
APPR:		

MATERIAL:
FINISH:
USED ON: CBM-PC
NEXT ASSY:

commodore

SCHEMATIC 23
MONOCHROME VIDEO PCB

SIZE C | 380412 | REV E
SCALE NONE | SHEET 3 OF 4

REVISIONS				
LTR	ZONE	DESCRIPTION	DATE	APPROVED

ENBLINK
CURBLINK
CLKDLY
DISENDLY
BLINK
CURDLY
CLKDLY
VD0-7
DATACLK
ENVID
DATACLK
RA0-3
B/L
S/L
DOTCLK
OSC

U27 1/3 74LS14
U4 74LS273
U11 1/2 74LS139
U10 74LS138
U21 74S374
U22 FPLA 82S100
U3 74LS374
U2 ROM 2332/2532
U1 9915/74LS166
U28 1/4 74LS00
U11 1/2 74LS139
U25 1/2 74LS244
U19 1/2 74LS244
74S174
U15 74S74
R1 20
R2 20
R3 2K2
C4 120p
C5 120p
J2 9 PIN D-SHELL
HSDLY
VSDLY
HS
VS
INT
VIDEO
TP
CLKDLY

commodore
SCHEMATIC 24
MONOCHROME VIDEO PCB
SIZE C 380412 REV E
SCALE NONE SHEET 4 OF +
CBM-PC

REVISIONS				
LTR	ZONE	DESCRIPTION	DATE	APPROVED
		SEE SHEET 1		

+5V
14
16.250 MHz
OSC
Y1
8
1
7
U4 ½ 74S04
11
10
3
4
+5V
U2
9
7
10
2
1
3
4
5
6
LPT
CLR
A
B
C
D
15 N.C.
14
13
12
11
Q_A
Q_B
Q_C
Q_D
74LS162/163
U4 ½ 74S04
6
5
+5V
20
U3
PAL
16R6
1
2
3
4
5
6
7
8
9
OE
10
11
19
18
17
16
15
14
13 N.C.
12
U4 ½ 74S04
9
8
U4 ½ 74S04
1
2
U9 ¼ 74LS00
1
2
3
4 DOT CLK
4 S/L
2 CCLK
2 $\overline{WII}$
2,3 MUX/CLKD
2 $\overline{OEI}$
2 $\overline{WI}$
4 DATACLK
2,4 $\overline{DATACLK}$
2 $\overline{OEII}$
4 OSC
4 $\overline{S/L}$

I/O READY
DØ
D7
AØ
A19
A10
AØ9 DØ
AØ8 1
AØ7 2
AØ6 3
AØ5 4
AØ4 5
AØ3 6
AØ2 D7
A31
A30
A29
A28
A27
A26
A25
A24
A23
A22
A21
A20
A19
A18
A17
A16
A15
A14
A13
A12
AØ
2
4
6
8
11
13
15
17
19
74LS 244 U43
$\overline{G1}$ $\overline{G2}$
74LS 244 U44
$\overline{G1}$ $\overline{G2}$
1
19
AØ
A
1
2
3
B
1
2
3
A1
A2
A3
U3E ½ 74LS11
12
U3F ¼ 74LS08
8
U3C ½ 74LS14
6
A18
MEMSEL
5
+5V
28
VCC
U8
I9
I10
I11
I12
I13
I14
I15
I0
I1
I2
I3
I4
I5
I6
I7
I8
26
25
24
23
22
21
20
9
8
7
6
5
4
3
2
27
828100
F5 12 MEMSEL 5
F7 10
F6 11
F4 13
F3 15
F2 16
F1 17
F0 18
FET GND CE
1
14
19
3 DØ-7
2,5 AØ-19, $\overline{MEMW}$
3 ENMONO
3 $\overline{RMONO}$
3,5 READ MEM
2 6845CS
3 CONTROL
3 STATUS
2 WRITE MEM

A19
$\overline{MEMW}$
$\overline{MEMR}$
$\overline{IOR}$
AEN
$\overline{IOW}$
RESET
XCLK
B03
B29
B01
B10
B31
B11
B12
B14
B15
B13
B02
B20
+5V
GND
+5V
5 x 47µF/16V
33 x 0.1µF
U4 ½ 74S04
13
12
U9 ¼ 74LS00
12
13
11
CLR
PR
D
CK
Q
$\overline{Q}$
TP
5
6 N.C.
¼ 74S74
2 $\overline{IOW}$
2,3 $\overline{RESET}$
2 6845E

71

UNLESS OTHERWISE SPECIFIED TOLERANCES ON: DECIMALS .X ±, .XX ±, .XXX ±, ANGLES ±	DRAWN BY: L. Brown	DATE	commodore
	CHKD:		SCHEMATIC 25 ADVANCED MONOCHROME VIDEO PCB
	ENGR:		
	APPR:		
MATERIAL: / FINISH: /	USED ON: CBM-PC	NEXT ASSY: PCB ASSY 380 053	SIZE C · 380470 · REV A
			SCALE NONE · SHEET 2 OF 6

REVISIONS				
LTR	ZONE	DESCRIPTION	DATE	APPROVED
		SEE SEEHT 1		

A0-19 1 — A0

MUX/CLKD 1

WRITEMEM 1

BD0-7 3

+5V

U19 6545 CRTC

20 VCC

BD0 33 / 1 32 / 2 31 / 3 30 / 4 29 / 5 28 / 6 27 / BD7 26 — D0 D7

MA0 4 / 5 1 / 6 2 / 7 3 / 8 4 / 9 5 / 10 6 / 11 7 / 12 8 / 13 9 / 14 MA13 / 15 / 16 / 17 } NC — MA0 MA13

RA0 38 / 37 1 / 36 2 / 35 RA3 / 34 NC — RA0 RA4

6845CS 1 — 26 CS

24 RS

6845E 1 — 23 Φ2

10W 1 — 22 R/W

CCLK 1 — 21 CLK

RESET 1 — 2 RESET

3 LPSTB

GND 1

DISPEN 18 / CURSOR 19 / HSYNC 39 / VSYNC 40

A1 A2 A3 A4 A5 A6 A7 A8 A9 A10 A11

U7 74LS157 — MA0 3 / MA1 2 / MA2 6 / MA3 5 — 1B 1A 2B 2A 3B 3A 4B 4A — 1Y 4 / 2Y 7 / 3Y 9 / 4Y 12 VA3 — S 1 / G 15

U18 74LS157 — MA4 3 / MA5 2 / MA6 6 / MA7 5 — 1B 1A 2B 2A 3B 3A 4B 4A — 1Y 4 VA4 / 2Y 7 / 3Y 9 / 4Y 12 VA7 — S 1 / G 15

U26 74LS157 — MA8 3 / MA9 2 / MA10 5 / 12 — 1B 1A 2B 2A 3B 3A 4B 4A — 1Y 4 VA8 / 2Y 7 VA9 / 3Y 9 VA10 / 4Y 12 3 WRITED — +5V 14 — S 1 / G 15

WI 1 — WRITED

OE I 1

WII 1

OE II 1

RA0-3 4

DATACLK 1

U17 2016 RAM 2k x 8 — +5V 24 VCC — A0 A10 — D0 D7 — W OE CS — GND 12 — VA0 8 / 1 7 / 2 6 / 3 5 / 4 4 / 5 3 / 6 2 / 7 1 / 8 23 / 9 22 / VA10 19 — 21 / 20 / 18 — VD0 9 / 10 1 / 11 2 / 13 3 / 14 4 / 15 5 / 16 6 / 17 VD7

U6 2016 RAM 2k x 8 — +5V 24 VCC — A0 A10 — D0 D7 — W OE CS — GND 12 — VA0 8 / 1 7 / 2 6 / 3 5 / 4 4 / 5 3 / 6 2 / 7 1 / 8 23 / 9 22 / VA10 19 — 21 / 20 / 18 — VD8 9 / 10 1 / 11 2 / 13 3 / 14 4 / 15 5 / 16 6 / 17 VD7

34 VD0-7

U5 74LS175 — 1D 4 / 2D 5 / 3D 12 / 4D 13 — 1Q 2 / 1Q 3 NC / 2Q 7 / 2Q 6 / 3Q 10 / 3Q 11 NC / 4Q 15 Nc / 4Q 14 — CLR 1 +5V

4 DISENDLY

4 CURDLY

4 CURDLY

3/4 HSDLY

4 VSDLY

4 CURBLINK

4 LLINK

2/3 74LS393

U27 — A 1 / CLR 2 — QA 3 / QB 4 / QC 5 / QD 6 } NC

U27 — A 13 / CLR 12 — QA 11 / QB 10 / QC 9 / QD 8 } NC

ENBLINK 3

UNLESS OTHERWISE SPECIFIED TOLERANCES ON DECIMALS .X ± .XX ± .XXX ± ∠'S ±	DRAWN BY: L. Biller	DATE	commodore
	CHKD:		SCHEMATIC 26 ADVANCED MONOCHROME VIDEO PCB
	ENGR:		
	APPR:		
MATERIAL: /	USED ON: CBM-PC	NEXT ASSY: PCB ASSY 380053	SIZE C — 380470 — REV A
FINISH: /			SCALE NONE — SHEET 3 OF 6

REVISIONS				
LTR	ZONE	DESCRIPTION	DATE	APPROVED
		SEE SHEET 1		

VD Ø-7 2

WRITED 2

RMONO 1

ENMONO 1

U42 74LS244

VD Ø 18 · 1 16 · 2 14 · 3 12 · 4 9 · 5 7 · 6 5 · VD 7 3

y y A A

1 G1 · 19 G2

BD Ø 2 · 4 1 · 6 2 · 8 3 · 11 4 · 13 5 · 15 6 · 17 BD 7

BD Ø 18 · 1 14 · 2 16 · 3 15 · 4 14 · 5 13 · 6 12 · BD 7 11

U45 74LS245

B B A A

1 DIR · 19 G

2 DØ · 3 1 · 4 2 · 5 3 · 6 4 · 7 5 · 8 6 · 9 D7

1 DØ-7

U33 74LS374

VD Ø 3 · 1 4 · 2 7 · 3 8 · 4 13 · 5 14 · 6 17 · VD 7 18

D D Q Q

11 OE

1 OE

BD Ø 2 · 5 1 · 6 2 · 9 3 · 12 4 · 15 5 · 16 6 · 19 BD 7

MUX/CLKD 1

READ MEM 1

MEMSELP 5

RESET 1

CONTROL 1

½74LS Ø2 U1

BD3 4

BDØ 5

BD12 12

1D 2D 3D 4D

1 CLR

9

U36 74LS175

1Q 1Q 2Q 2Q 3Q 3Q 4Q 4Q

2 · 3 NC · 7 · 6 NC · 10 · 11 · 15 NC · 14 NC

4 ENVID

5 ZGE

2 ENBLINK

2 ENBLINK

HSDLY 2

VIDEO 4

STATUS 1

U34 ½74LS244

11 · 13 · 15 · 17 A A

19 G2

Y Y

9 BDØ · 7 1 · 5 2 · 3 BD3

2.5 BDØ-7

UNLESS OTHERWISE SPECIFIED TOLERANCES ON: DECIMALS .X ±, .XX ±, .XXX ±, ∠'S ±	DRAWN BY: L. Bieber	DATE
	CHKD:	
	ENGR:	
	APPR:	
MATERIAL: /	USED ON: CBM-PC	NEXT ASSY: PCB ASSY 380 053
FINISH: /		

commodore

SCHEMATIC ADVANCED 27

MCA SCHEME VIDEO PCB

SIZE		REV
C	380 470	A

SCALE · SHEET 4 OF 5

REVISIONS				
LTR	ZONE	DESCRIPTION	DATE	APPROVED
		SEE SHEET 1		

ENBLINK
CURBLINK
CLKDLY
DISENDLY
BLINK
CURDLY
CURDLY
VDØ-7
DATACLK
ENVID
DATACLK
CLR
VDQØ
VDQ7
RAØ-3
S/L
S/L
DOTCLK
OSC
CHBUS
DOTØ-8
RØ-7
DNODIS
DRVS
VAT4
VAT6
HSDLY
VSDLY
SBN
VIDEO
+5V
TP
CLKDLY
NC
9 PIN D-SHELL

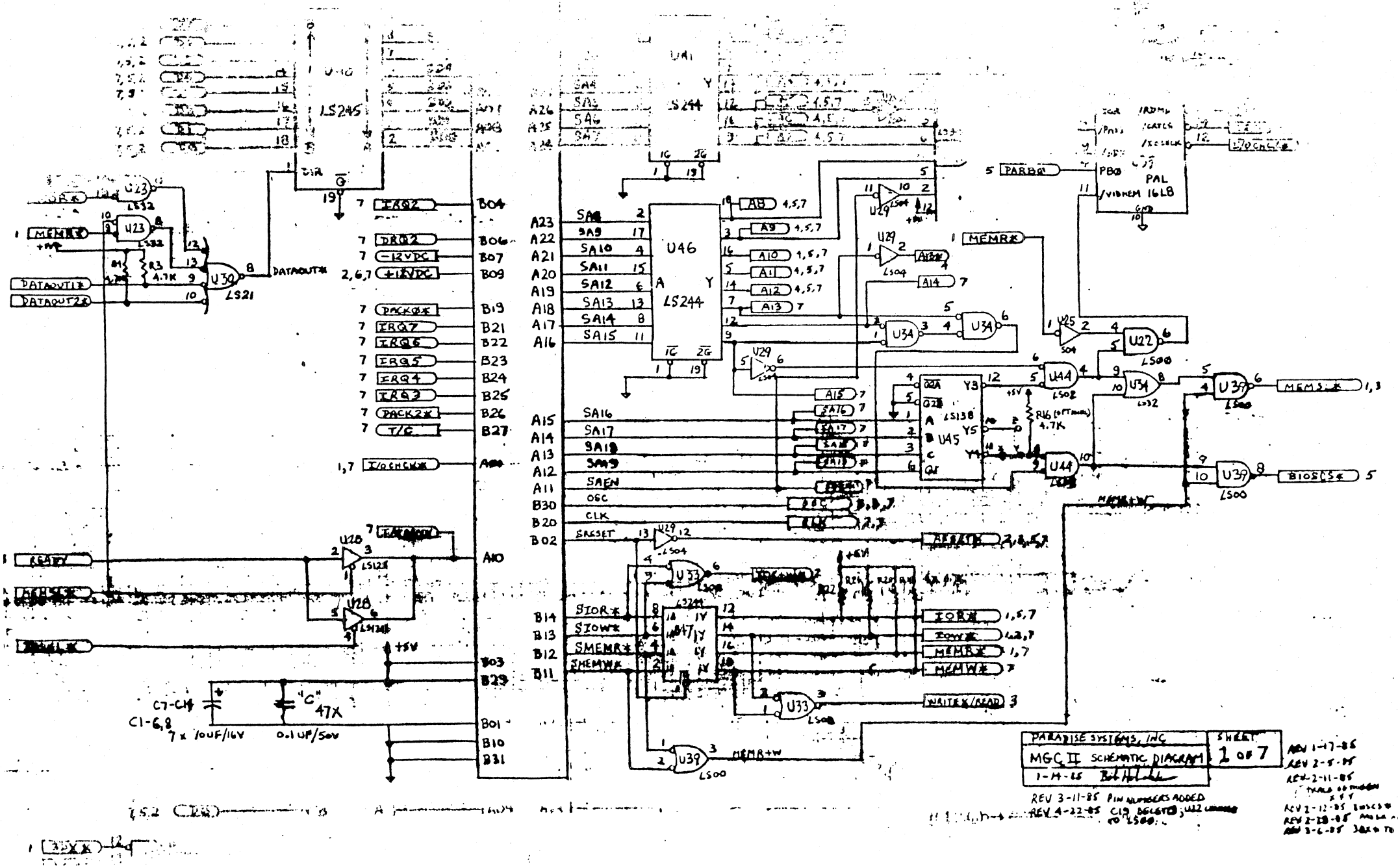
U35 1/3 74LS11
U16 74LS 273
U24 74LS 374
U29 1/2 74LS139
U9 1/4 74LSØØ
U37 74LS 374
U20 8281ØØ
U22 ROM 2532
U38 74LS 166
U10 74S 174
U10 DI Q1 D2 Q2
U34 1/2 74LS244
U11 74S74
R3 220
R4 220
C32 120p
C21 120p
R1 2K2

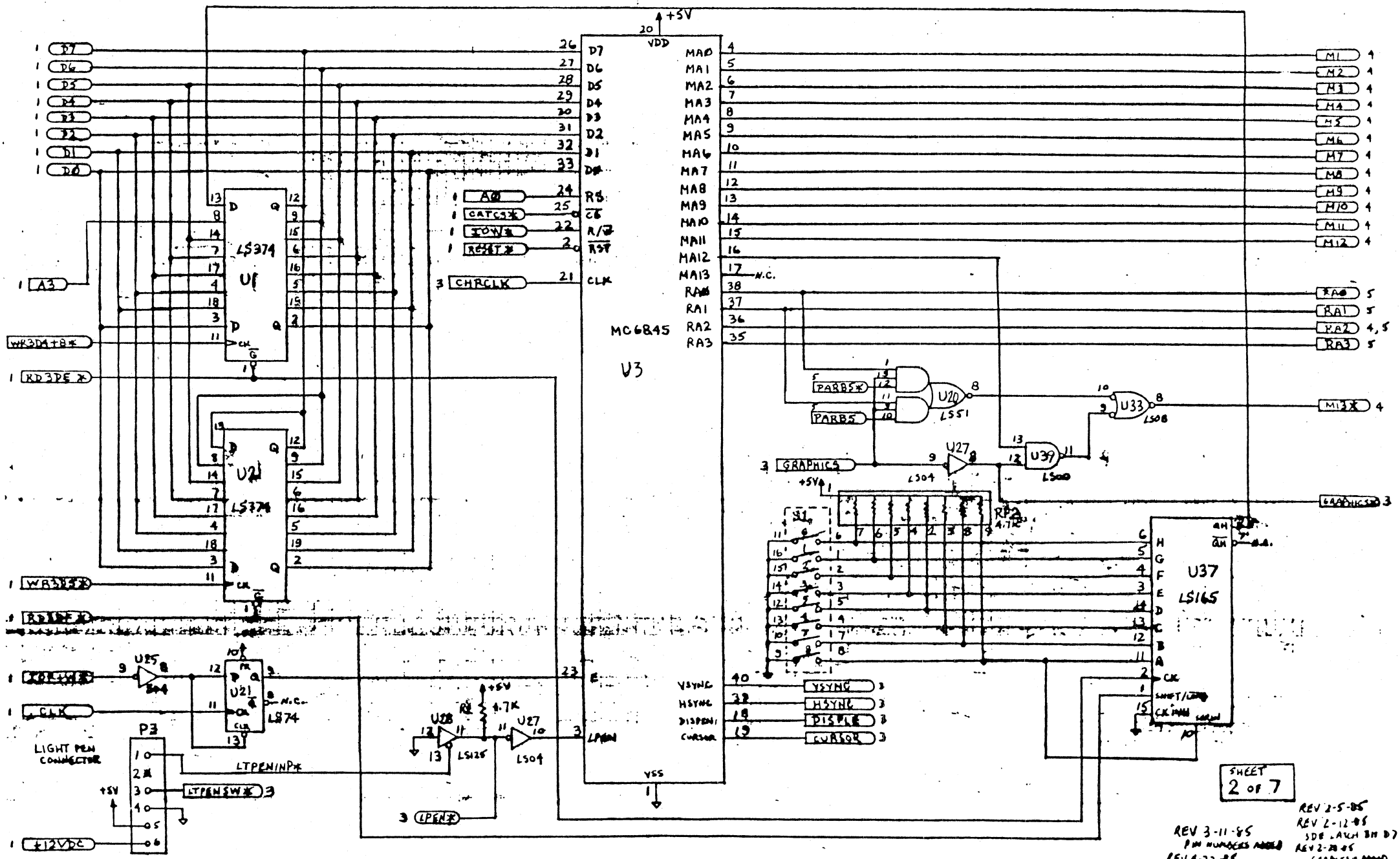
UNLESS OTHERWISE SPECIFIED: TOLERANCES ON: DECIMALS .X ±, .XX ±, .XXX ±, ∠ ±°	DRAWN BY: P.Liber	DATE	commodore	
	CHKD:		SCHEMATIC ADVANCED MONOCHROME VIDEO	28 PCB
MATERIAL:	ENGR:			
FINISH:	APPR:			
	USED ON: CBM PC	NEXT ASSY: PCB ASSY 380053	SIZE C	380 470 REV A
			SCALE NONE	SHEET 5 OF 6

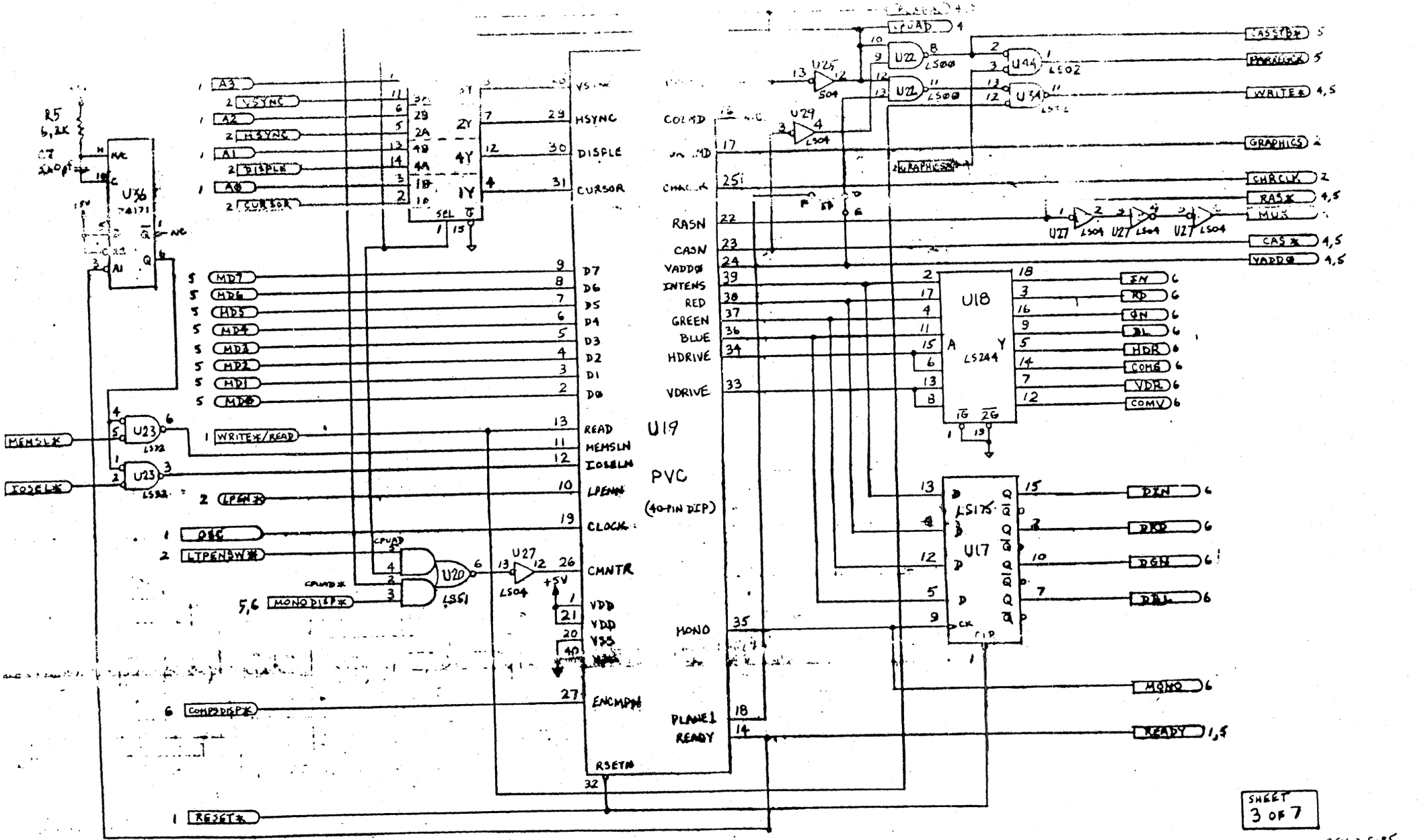
REVISIONS				
LTR	ZONE	DESCRIPTION	DATE	APPROVED
		SEE SHEET 1		

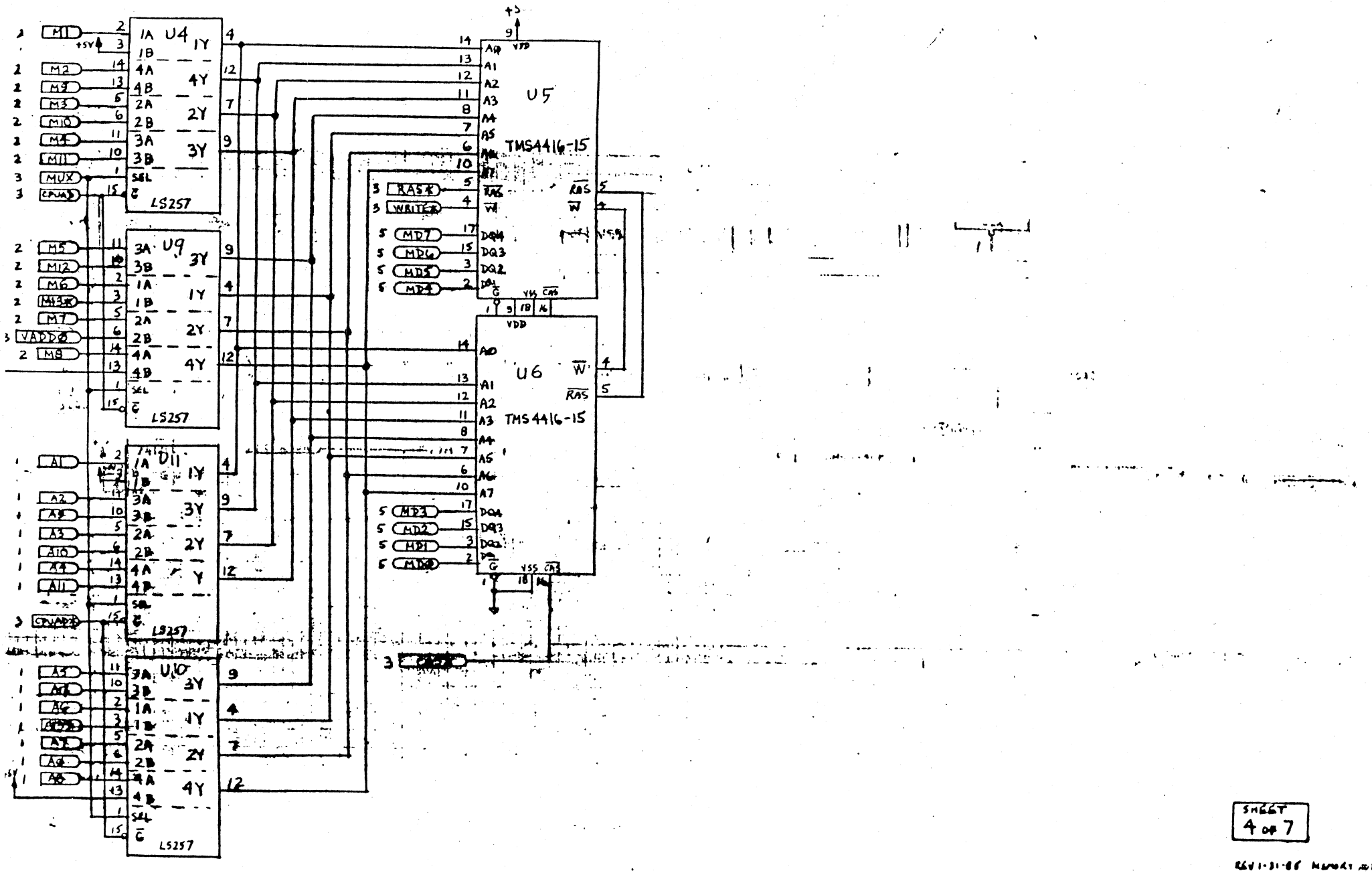
A0-A14
MEMW
74LS 157 U40
74LS 157 U25
74LS 157 U31
74LS 157 U13
6116 U23
6116 U32
6264 U14
6167 U15
8x 2k2 RN1
+5V
CS2
CS1
WE
OE
CS
Dout
Din
½74LS125
½74LSØ2 U1
U28
DOTØ-8
DOT8
74LS 157 U12
74LS 157 U39
DOT7
DOTØ
RØ-7
SYN
74LS 245 U41
BDØ-7
BD7
CD7
CDØ
CHBUS
82S1ØØ U21
½ 74LS139 U30
ZGMUX
CSROM
CHCS4
CHCSA
CHCSB
DNODIS
DRVS
MEMSELP
MEMSEL
ZGE
VDQ7
VAT4
5
VAT6
A0
A12
A13
A14
ENA
+5V
LADMEM

UNLESS OTHERWISE SPECIFIED TOLERANCES ON: DECIMALS .X ±, .XX ±, .XXX ±, ∠ ±°	DRAWN BY: R Rick	DATE	commodore
	CHKD:		SCHEMATIC 29 ADVANCED MONOCHROME VIDEO PCB
	ENGR:		
	APPR:		
MATERIAL: / FINISH: /	USED ON: CBM PC	NEXT ASSY: PCB ASSY 380053	SIZE C 380 470 REV A
			SCALE NONE SHEET 6 OF 6


U46
LS244
U41
LS244
U10
LS245
U30
LS21
U45
LS138
PAL
16L8
PARADISE SYSTEMS, INC
MGC II SCHEMATIC DIAGRAM
SHEET 1 OF 7
1-M-85
REV 3-11-85 PIN NUMBERS ADDED
REV 4-22-85 C19 DELETED
REV 1-17-85
REV 2-5-85
REV 2-11-85
REV 2-12-85
REV 2-28-85
REV 3-6-85

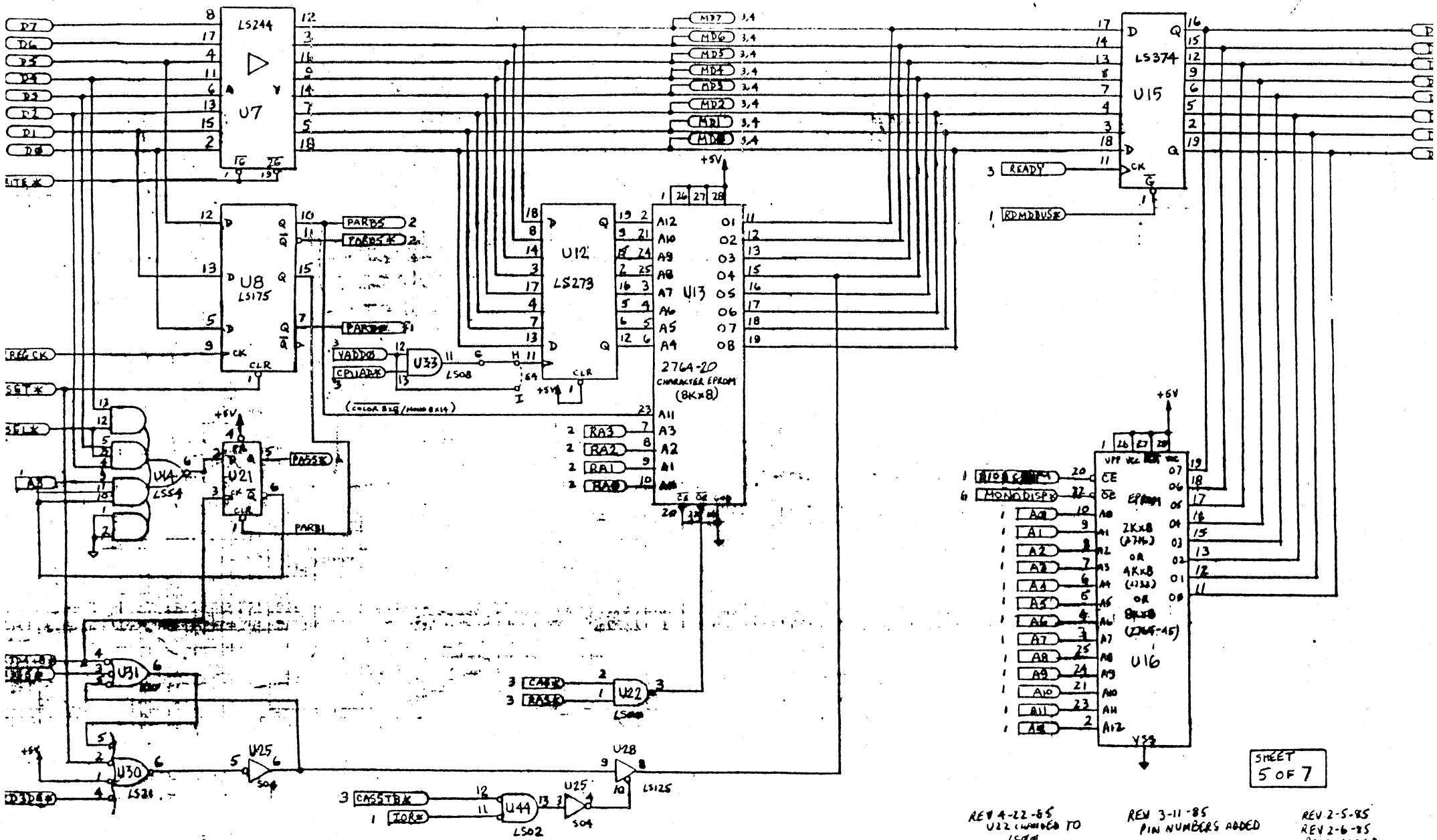

+5V
MC6845
U3
VDD
VSS
D7
D6
D5
D4
D3
D2
D1
D0
MA0
MA1
MA2
MA3
MA4
MA5
MA6
MA7
MA8
MA9
MA10
MA11
MA12
MA13
N.C.
RA0
RA1
RA2
RA3
RS
CS
R/W
RST
CLK
VSYNC
HSYNC
DISPEN
CURSOR
LPEN
M1
M2
M3
M4
M5
M6
M7
M8
M9
M10
M11
M12
RA0
RA1
RA2
RA3
M13X
GRAPHICS
GRAPHICSX
A0
CATCSX
IOWX
RESETX
CHRCLK
A3
WR3DATBX
RD3DEX
WR3DATSX
RD3DATX
XDATSWX
CLK
LTPENINPX
LTPENSWX
LPENX
+12VDC
U1
U2
U21
U25
U26
U27
U28
U20
U33
U39
U37
LS374
LS374
LS74
LS04
LS26
LS04
LS51
LS08
LS00
LS165
R1
4.7K
RP2
4.7K
S1
P3
LIGHT PEN CONNECTOR
SHIFT/LOAD
CLK INH
SER
QH
QH
SHEET 2 OF 7
REV 2-5-85
REV 2-12-85
SDE LATCH BIT D7
REV 2-28-85
GRAPHICS MODE
REV 3-11-85
PIN NUMBERS MODIFIED
REV 4-22-85
S1, RP2, & U37 MODIFIED

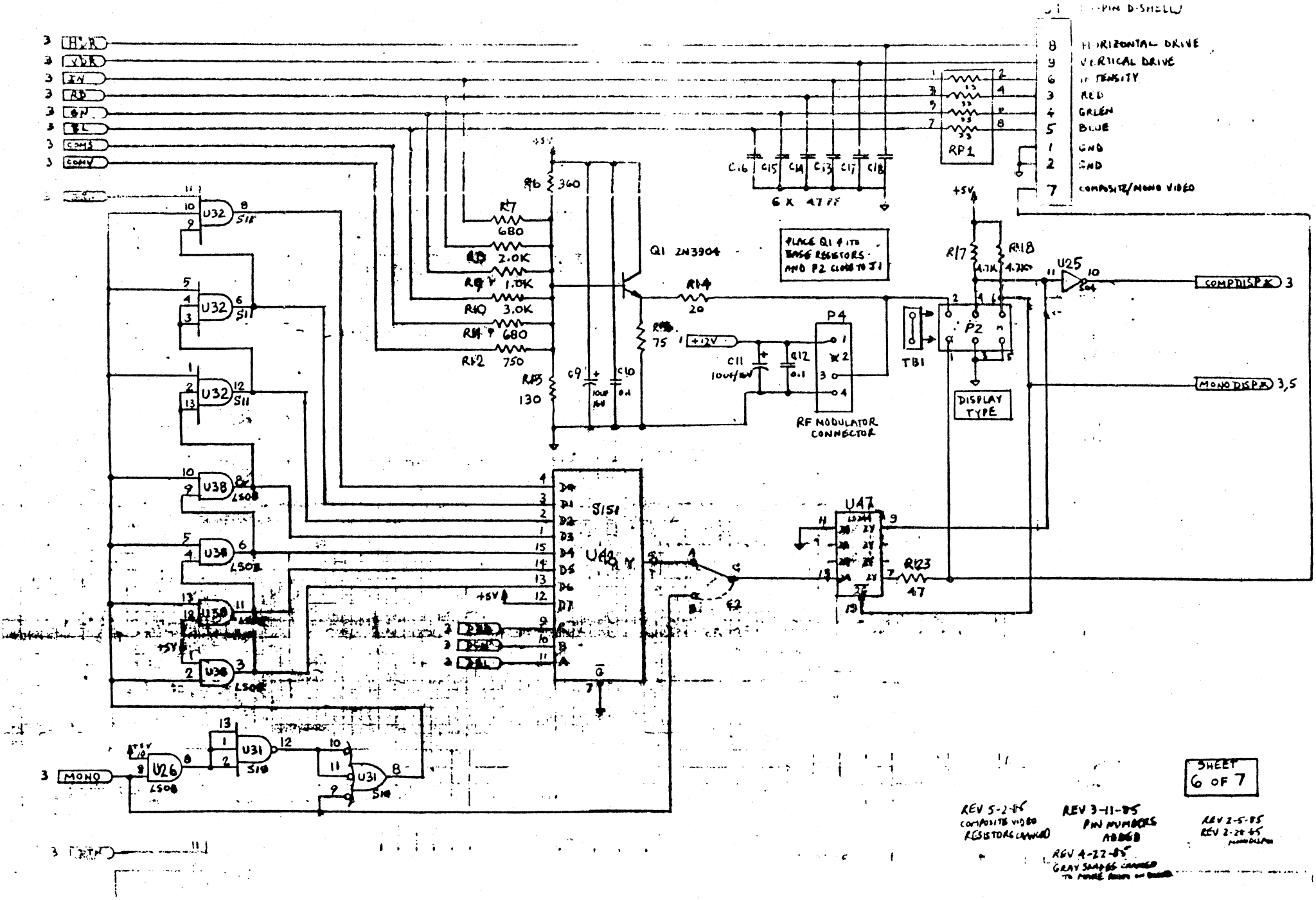

U19
PVC
(40-PIN DIP)
U18
LS244
U17
LS175
U36
74LS171
U23
LS32
U20
LS51
U27
LS04
U25
LS04
U29
LS04
U22
LS00
U44
LS02
U34
LS32
U27
LS04
U27
LS04
U27
LS04
R5
6.2K
C7
.01 μF
A3
VSYNC
A2
HSYNC
A1
DISPLE
A0
CURSOR
SEL
2Y
4Y
1Y
VSYNC
HSYNC
DISPLE
CURSOR
MD7
MD6
MD5
MD4
MD3
MD2
MD1
MD0
D7
D6
D5
D4
D3
D2
D1
D0
COLMD
GRAPHICS
CHARCLK
RASN
CASN
VADD0
INTENS
RED
GREEN
BLUE
HDRIVE
VDRIVE
READ
MEMSLN
IOSELN
LPENN
CLOCK
CMNTR
VDD
VDD
VSS
MONO
ENCMPN
PLANE1
READY
RSETN
MEMSLK*
IOSELK*
WRITE*/READ
LPEN*
DSC
LIPENSW*
CPUAD
CMNTR*
MONODISP*
COMPDISP*
RESET*
CPUAD
CASSTB*
PWRMUX*
WRITE*
GRAPHICS
CHRCLK
RAS*
MUX
CAS*
VADD0
EN
RD
GN
BL
HDR
COMG
VDR
COMV
DRN
DRD
DGN
DBL
MONO
READY
SHEET
3 OF 7
REV 4-22-85
U22 CHANGED TO LS00
REV 3-11-85
PIN NUMBERS
ADDED
REV 3-26-85
REV 2-5-85
REV 2-6-85
ONE SHOT CHANGED
REV 2-28-85
CASSTB#

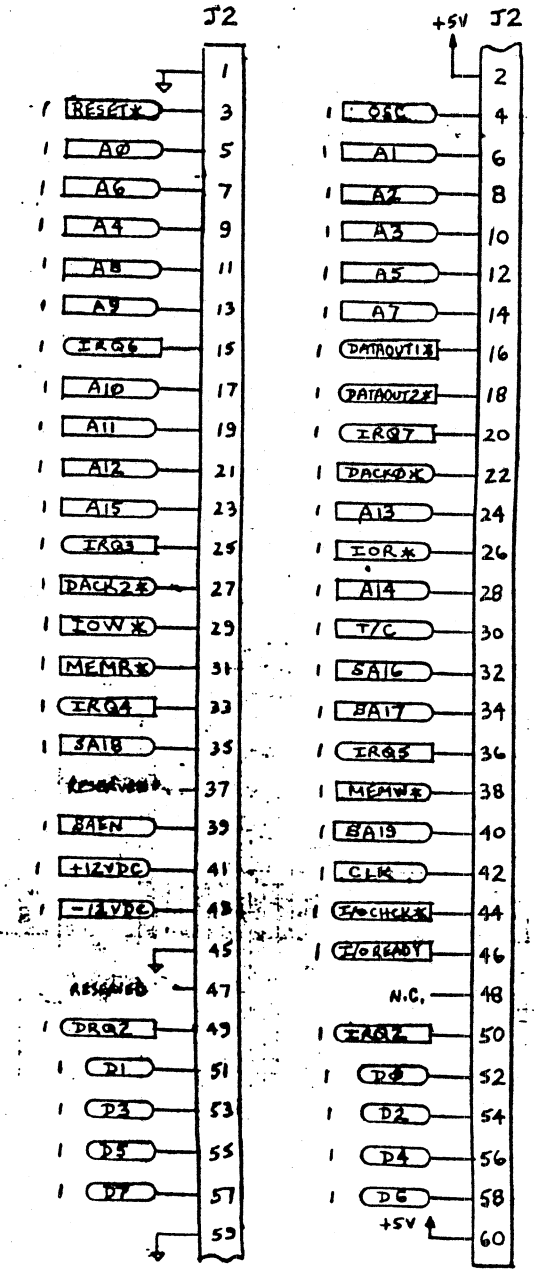


SHEET 4 OF 7

REV 1-31-86 MEMORY ADDRESS
REV 3-11-86 PIN NUMBERS ADDED


U7
LS244
U8
LS175
U12
LS273
U13
2764-20
CHARACTER EPROM
(8K×8)
U15
LS374
U16
2K×8
4K×8
8K×8
U4
LS54
U21
U31
U30
LS20
U25
U22
U28
LS125
U44
LS02
U33
LS08
READY
RDMDBUS*
MONODISP*
PARBS
PARBS*
PARBI
PASS*
CAS*
RAS*
CASSTB*
IOR*
+5V
SHEET
5 OF 7
REV 4-22-85
U22 CHANGED TO
LS00
REV 3-11-85
PIN NUMBERS ADDED
REV 3-12-85
U8 CHANGED TO LS175
PARBI ADDED
REV 2-5-85
REV 2-6-85
PARBI ADDED


J1 9-PIN D-SHELL
8 HORIZONTAL DRIVE
9 VERTICAL DRIVE
6 INTENSITY
3 RED
4 GREEN
5 BLUE
1 GND
2 GND
7 COMPOSITE/MONO VIDEO
RP1
C16 C15 C14 C13 C17 C18
6 X 47 PF
+5V
R6 360
R7 680
R8 2.0K
R9 1.0K
R10 3.0K
R11 680
R12 750
R13 130
Q1 2N3904
PLACE Q1 & ITS BASE RESISTORS AND P2 CLOSE TO J1
R14 20
R15 75
+12V
C9 100uF/16V
C10 0.1
C11 100uF/16V
C12 0.1
P4
RF MODULATOR CONNECTOR
R17 4.7K
R18 4.7K
U25
P2
TB1
DISPLAY TYPE
COMPDISP 3
MONODISP 3,5
U32 S18
U32 S11
U32 S11
U38 LS08
U38 LS08
U38 LS08
U38 LS08
U26 LS08
U31 S10
U31 S10
S151
U40
U47
R23 47
MONO
SHEET 6 OF 7
REV 5-2-85 COMPOSITE VIDEO RESISTORS CHANGED
REV 3-11-85 PIN NUMBERS ADDED
REV 4-22-85 GRAY SHADES CHANGED TO POWER BLUE ON BLACK
REV 2-5-85
REV 2-28-85 MONO DISP



NOTES

PIN 37 SUPPLIES DACK1* FROM ISA EDGE CONNECTOR TO MODULES ON PREVIOUS MGC CARDS.

PIN 47 SUPPLIES -5V ON PREVIOUS MGC CARDS.

SHEET 7 OF 7

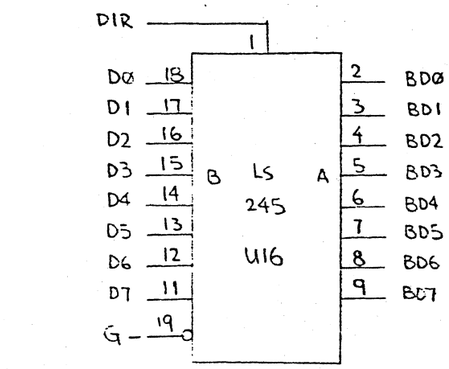
REV 1-17-85

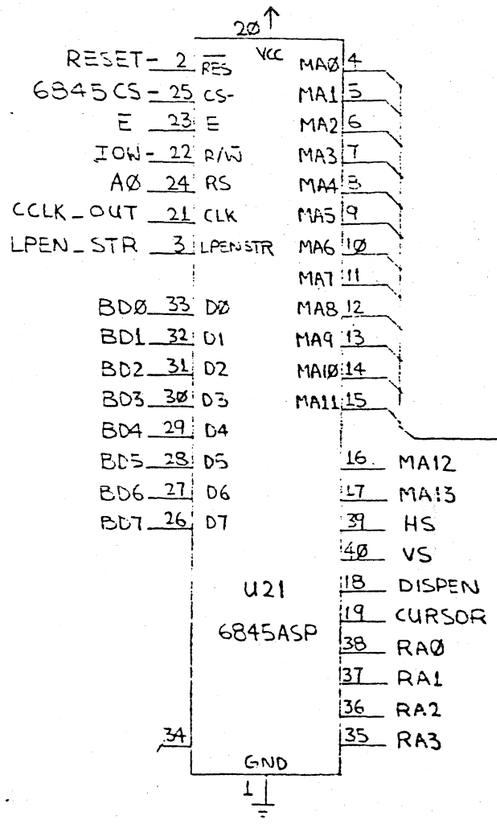
I.C. VOLTAGE AND DESIGNATION				
TYPE	DESIGNATION	+5V	GND	SPARE
LS74	U9	14	7	
LS367A	U13	14	7	
LS273	U2	20	10	
LS166	U6	16	8	
LS257A	U18,20,23,24	16	8	
P16L8A	U1,5,8,12,15	20	10	
LS245	U16	20	10	
4416	U4,7,10,14,17,19 22,25	9	18	
2764	U3	28	14	
68A45	U21	20	1	
CW16800	U11	45	13,34,76	
CRYSTAL	XTAL1	14	7	

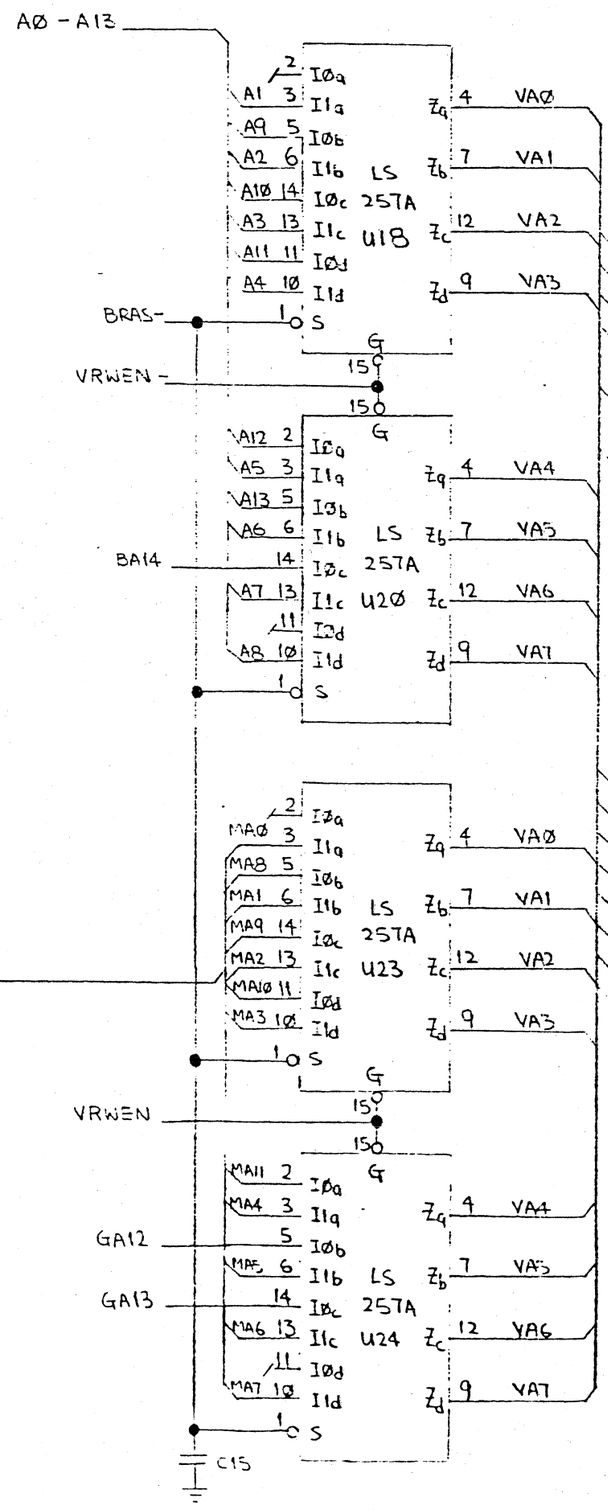
COMPONENT LIST	
TYPE	DESIGNATION
RESISTORS	
20 OHM	R6, R11
75 OHM	R5
360 OHM	R4
680 OHM	R1
750 OHM	R3, R10
1.1K OHM	R8
2.2K OHM	R7
3.3K OHM	R9, R10A
CAPACITORS	
10 µF	C1, C21, C22
0.1 µF	C2, C20, C4, C7, C8A, C15, C18, C19
0.01 µF	C8A
120 pF	C6, C6A, C9, C10 C11, C12, C13
470 pF	C3
TRANSISTOR	
2N3904	Q1
CONNECTORS	
1x2 BERG	P1
1x4 BERG	P2
1x6 BERG	P3
9 PIN D_TYPE	S1
25 PIN D_TYPE	S2
62 PIN SOCKET STRIP	P5
20 PIN SOCKET STRIP	P4
DIP SWITCH 8 POSITION	SW

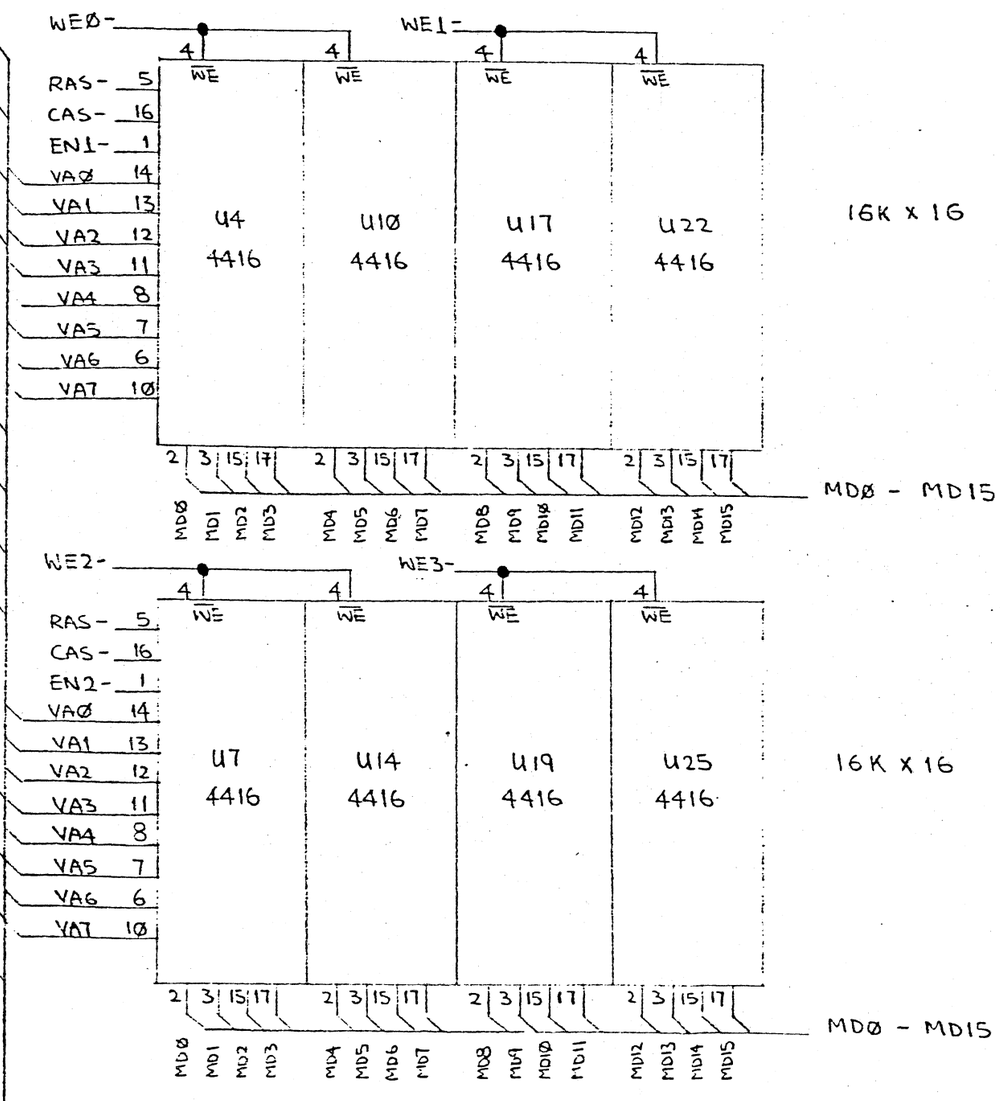
REVISIONS		
NO.	DATE	BY
1	NOV 16, 85	C.W.
2		
3		
4		
5		

Drawn by C.W.	Scale	Material
Chk'd. L.K.	Date OCT. 20, 85	Drawing No. 1 OF 7
Traced	App'd.	









REVISIONS		
NO.	DATE	BY
1	NOV. 16, 85	C.W.
2		
3		
4		
5		

Drawn by C.W.	Scale	Material
Chk'd. L.K	Date OCT. 28, 85	Drawing No.
Traced	App'd.	2 OF

P16L8 U12: RA0 1, RA1 2, RA2 3, RA3 4, MA12 9, MA13 13, 132 7, G_TB 8, MCB 15, GRPH 11, P 6, CLR_S/R 5 → 14 GA12, 18 GA13, 16 EA11, 19 EA12, 17 RA, 12 MCLR_S/R

P16L8 U8: RESET 3, HS_OUT 2, VS_OUT 1, G_GATE 6, BA15 7, BA16 18, A17 16, A18 8, A19 13, CSEL 4, GSEL 5, MEMW- 11 → 19, 12 G-, 15 CPU_MSEL-, 14 RESET-, 9 MEMR-, 17

U13 LS367: R_OUT 12 → 11 R; G_OUT 10 → 9 G; B_OUT 14 → 13 B; I_OUT 6 → 7 I; HS_OUT 4 → 5; VIDEO 2 → 3

120p C13, C11, C12, C10, C9, C17; R11 2Ø; SW3, SW4; C6A

S1 DB_9 CONNECTOR: 3, 4, 5, 6, 8, 7, 9, 1, 2

R 1.1K R8; G 2.2K R7; B 3.3K R9; I 75Ø R10; 68Ø R1; 75Ø R2; C6 100p; COMP_COLOR; SW5

750 R3; 360 R4; Q1 2N3904; R6 2Ø; R5 75

P3 RF CONNECTOR: 1, 2, 3, 4

P1 COMPOSITE CONNECTOR: 1, 2

XTAL1 16.257MHz: 14, 8 → 16MHz, 7

P16L8 U15: 2, MEMW- 4, RESET 8, IOW- 3, AEN 11, CCLK- 7, LPEN_SW 17, IOR- 6, R10A, CAS- 1, M 33K 5, 18 → 15 CCLK_OUT, 19, 17 M' 10n C8A, 12 DIR, 14 BD1, 13 BD2, 16 NC

P16L8 U5: A9 1, A8 8, A7 17, A6 7, A5 18, A4 6, A3 5, A2 4, A1 3, A0 2, M_CB 9 → 12, 13 6845 CS-, 19 CS-, 14 3BX-, 15, 16

P16L8 U1: LPEN 1, 132 3, WEL- 6, WEH- 5, A0 11, VRWEN- 2, CC5 7, CC6 8, CC7 9, DOT0 4 → 19 WE0-, 17 WE1-, 18 WE2-, 16 WE3-, 15, 12 DOT0', 14, 13 VRWEN+

U9 LS74 (PR, D, CLR, Q, Q̄): 4, 2, 3, 1, 5, 6 → LPEN_STR

U9 LS74 (CLR, D, PR, Q, Q̄): 13, 12, 10, 9, 8 → E; IO-CLK 11

LPEN_STR; CCLATCH0; MD0-MD7

U2 LS 273 (D, Q): MD0 18, MD1 17, MD2 14, MD3 13, MD4 8, MD5 7, MD6 4, MD7 3 → 19, 16, 15, 12, 9, 6, 5, 2; 11, 1

U3 2764 250ns: A0 10, A1 9, A2 8, A3 7, A4 6, A5 5, A6 4, A7 3, A8 23, A9 24, A10 21, A11 23, A12 2; CC5 6, CC6 5, CC7 2; 14; D0 11, D1 12, D2 13, D3 15, D4 16, D5 17, D6 18, D7 19; 1, 27, 28; 26 M_CB; 22; 20

DOT0; DOT0' C3 470p

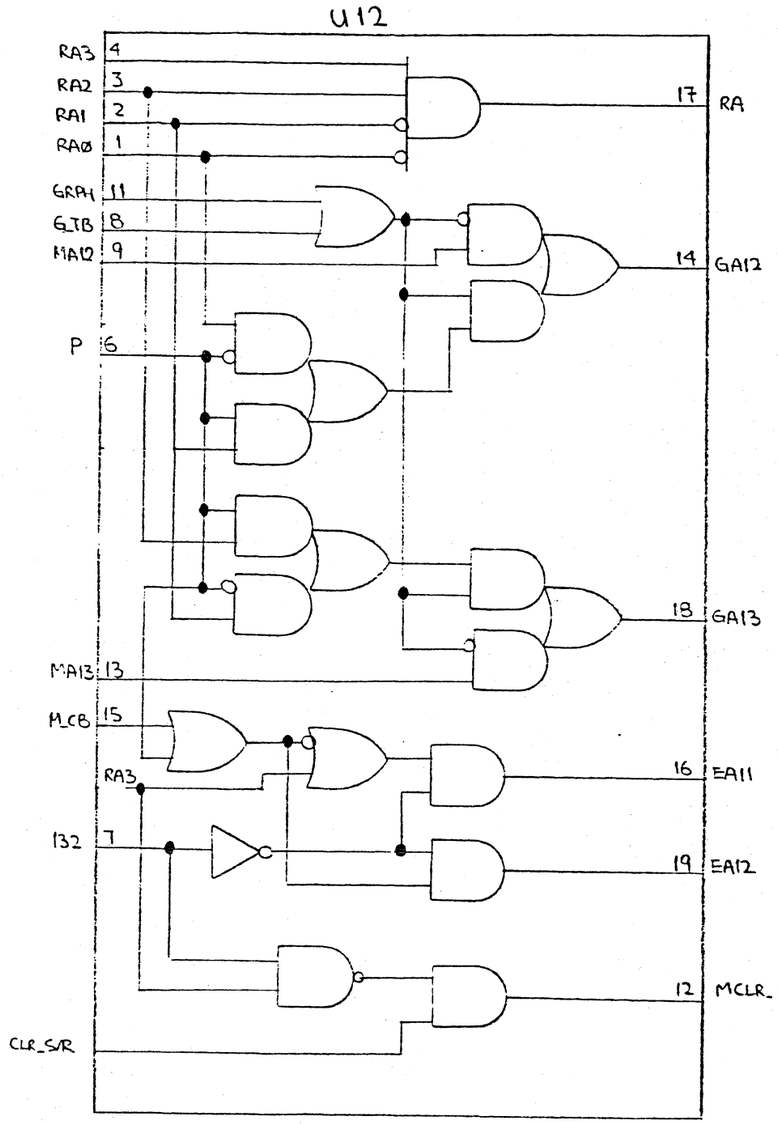
U6 LS 166 (A, H, QH): 2, 1, 7, 9 MCLR_S/R; 13 CHR_DOT; 15 S_LB; 6

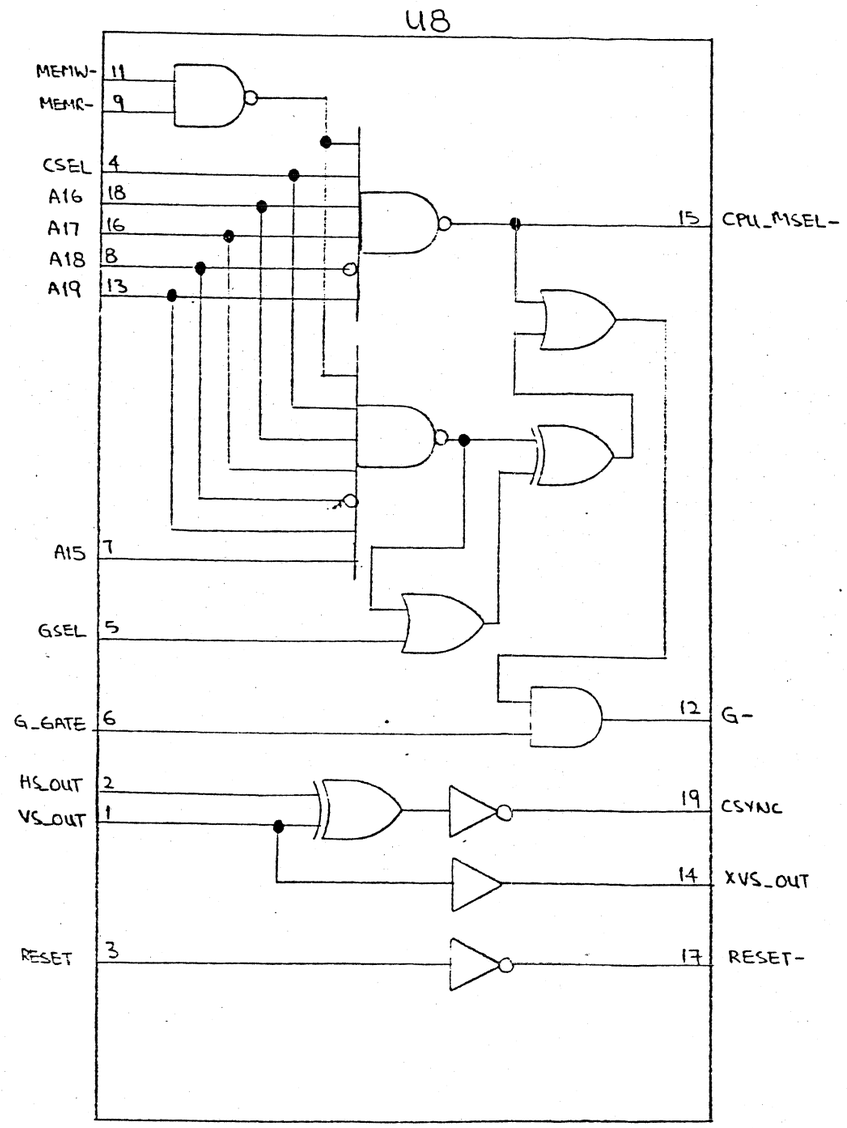
P2 LIGHT PEN CONNECTOR: LPEN 1, 2, LPEN_SW 3, +5V 4, +12V 5, 6

PIANO SWITCH: M SW1, C SW2, A15 SW8 → BA15, A16 SW7 → BA16, SW6 → (RESERVED)

REVISIONS		
NO.	DATE	BY
1	NOV.16,85	C.W.
2		
3		
4		
5		

Drawn by C.W.	Scale	Material
Chk'd. L.K	Date OCT.20.85	Drawing No. 3 OF 7
Traced	App'd.	

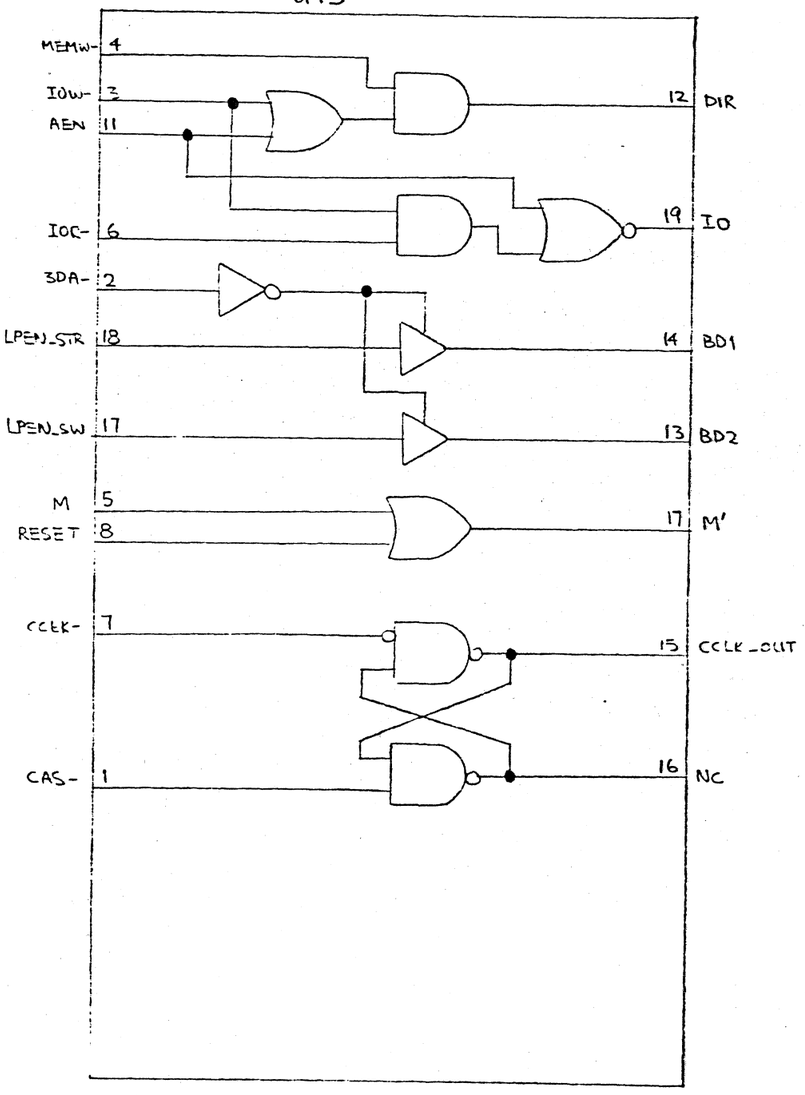




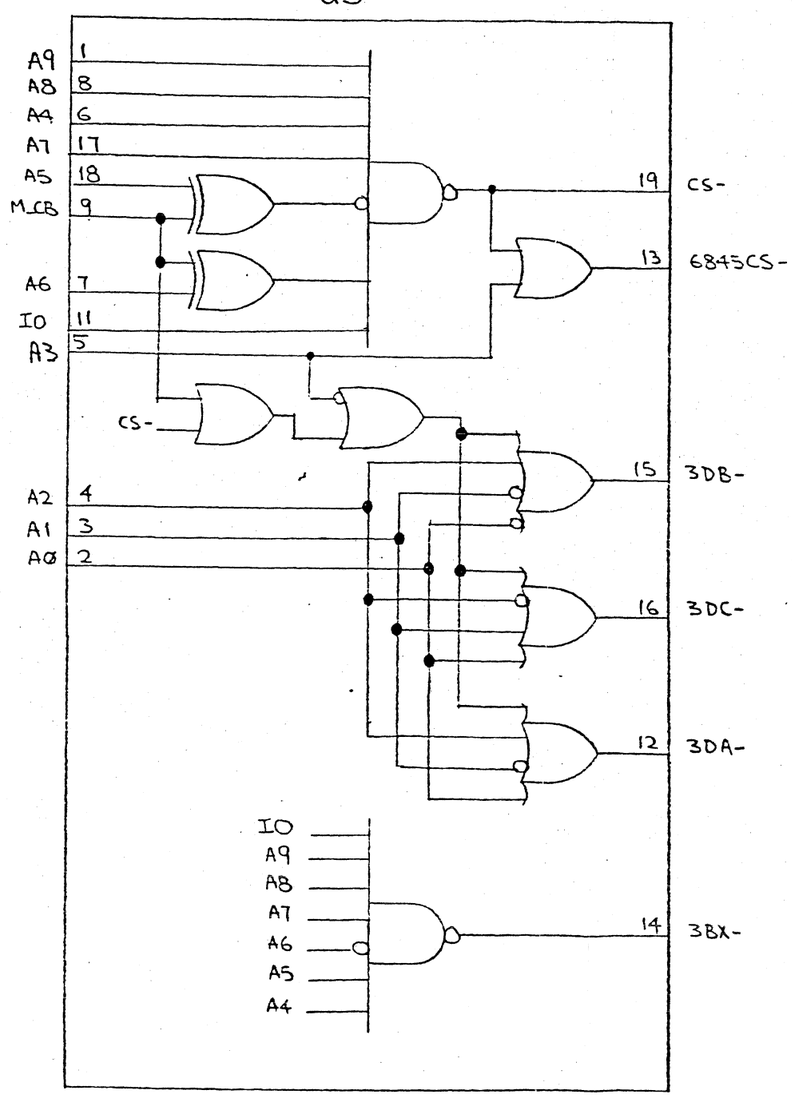
REVISIONS		
NO.	DATE	BY
1	NOV.16,85	C.W.
2		
3		
4		
5		

Drawn by C.W.	Scale	Material
Chk'd. L.K	Date OCT.28,85	Drawing No.
Traced	App'd.	4 OF 7

U15

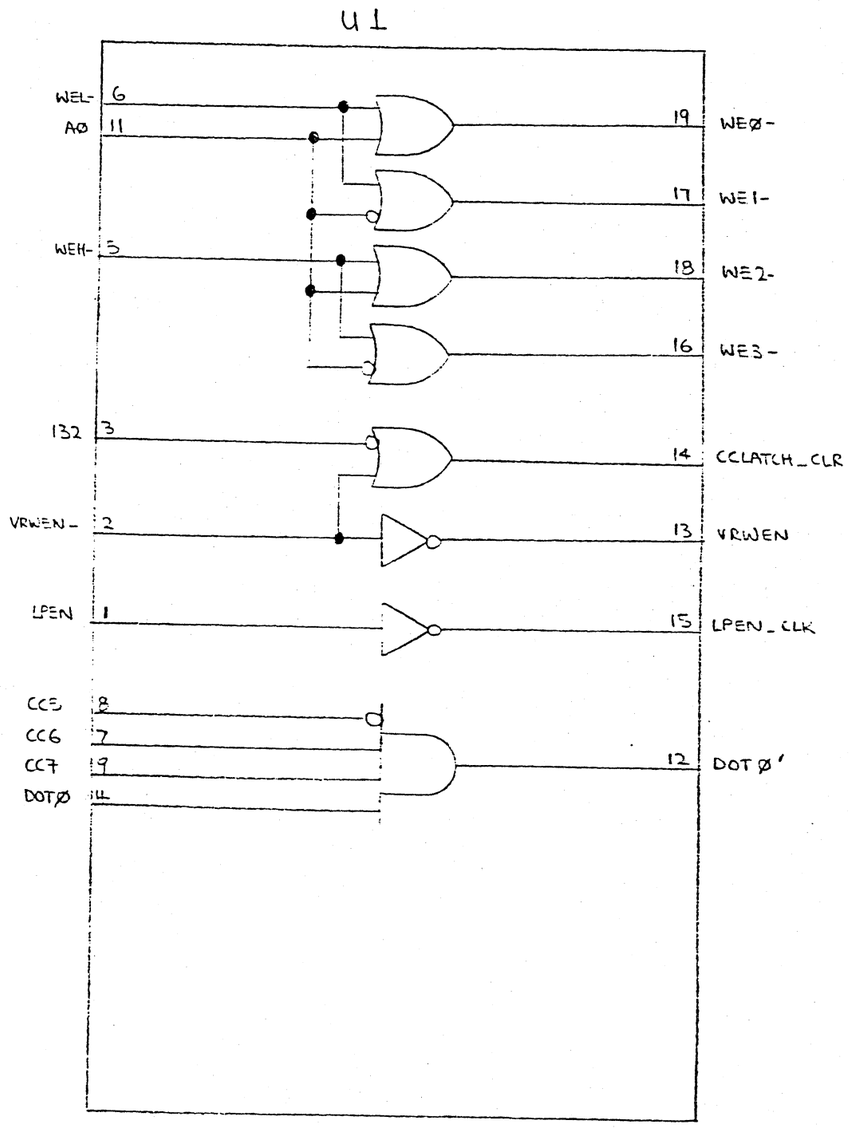


U5



REVISIONS		
NO.	DATE	BY
1	NOV.16,85	C.W.
2		
3		
4		
5		

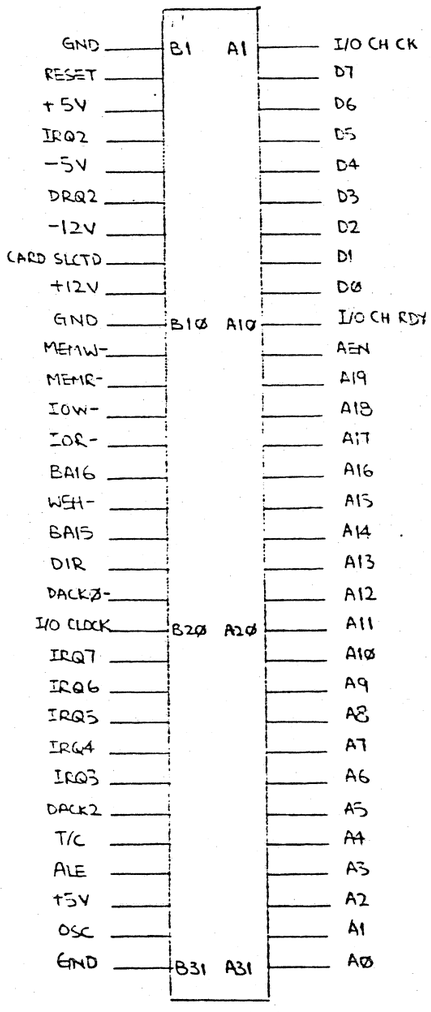
Drawn by C.W.	Scale	Material
Chk'd. L.K.	Date OCT. 28, 85	Drawing No.
Traced	App'd.	5 OF 7



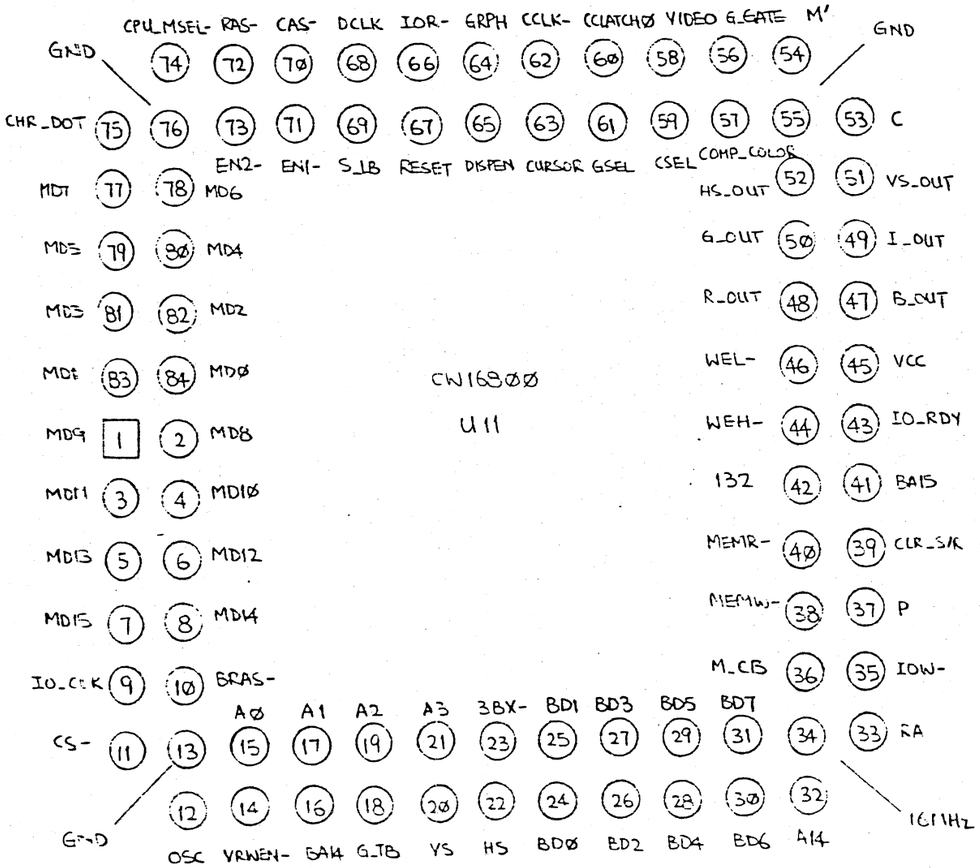
REVISIONS		
NO.	DATE	BY
1	NOV. 16, 85	C.W.
2		
3		
4		
5		

Drawn by C.W.	Scale	Material
Chk'd. L.K.	Date OCT. 28. 85	Drawing 6 OF
Traced	App'd.	

A850 2124H



EXPANSION CONNECTOR



REVISIONS		
NO.	DATE	BY
1	NOV. 16, 85	C.W.
2		
3		
4		
5		

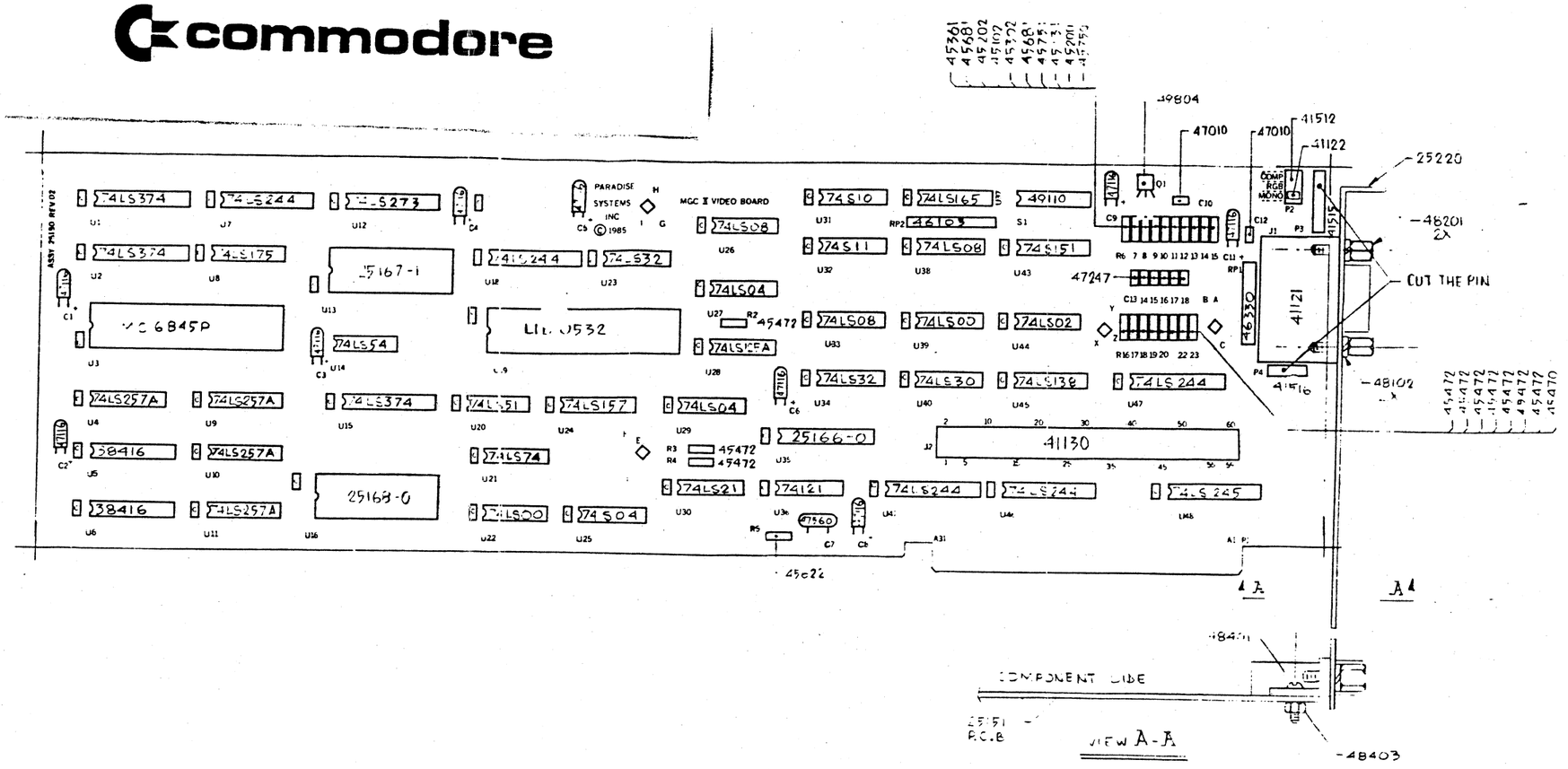
Drawn by C.W.	Scale	Material
Chk'd. L.K	Date OCT. 28, 85	Drawing No. 7 OF 7
Traced	App'd.	

REV	DESCRIPTION	DATE
03	HANGER ACCORDING ARTWORK REVISE	1-3-4

With the Compliments

of

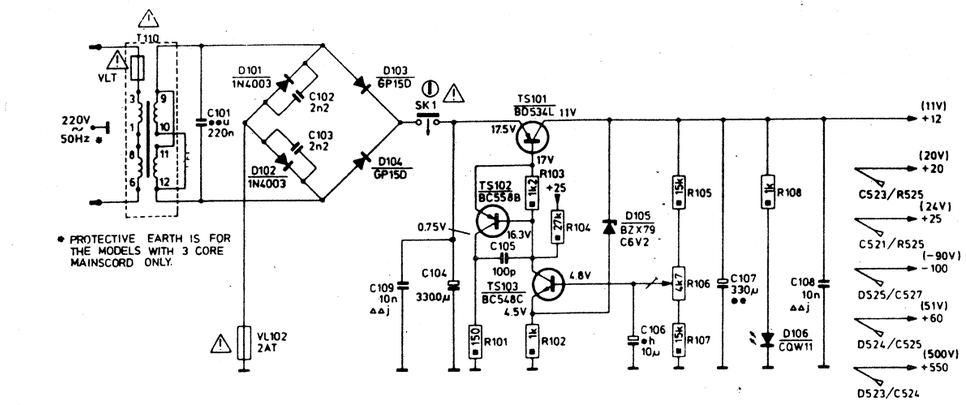
commodore



NOTES:

1. DO NOT INSTALL RESISTOR R16.
2. SET ALL SWITCH LEVERS OF S1 TO THE OFF OR OPEN POSITION PRIOR TO SHIPMENT.

DRAWN NS	DATE 14AY1-85	
CHECKED	DATE	
APPR BC HEIL	DATE 16MA185	
		SIZE FSCM NO DWG NO 25150
		SCALE



* PROTECTIVE EARTH IS FOR THE MODELS WITH 3 CORE MAINSCORD ONLY.

SAFETY RESISTOR
RESISTENZA DI SICUREZZA
SFR25 - 0.125W 5%
CR37 - 0.25W 5-10%
CERAMIC - CERAMICO
FLAT - FOIL - PIATTO
ELECTROLYTIC

OSCILLOGRAMMI: (PM5519)
REGOLARE L USCITA VIDEO SU 0.4Vcc
CON IL GENERATORE SULLA
SCALA DEI GRIGI

MASSIMO MASSIMO

40kΩ/V (PM2411)

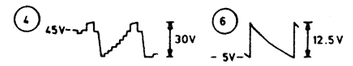
MAX. MIN.

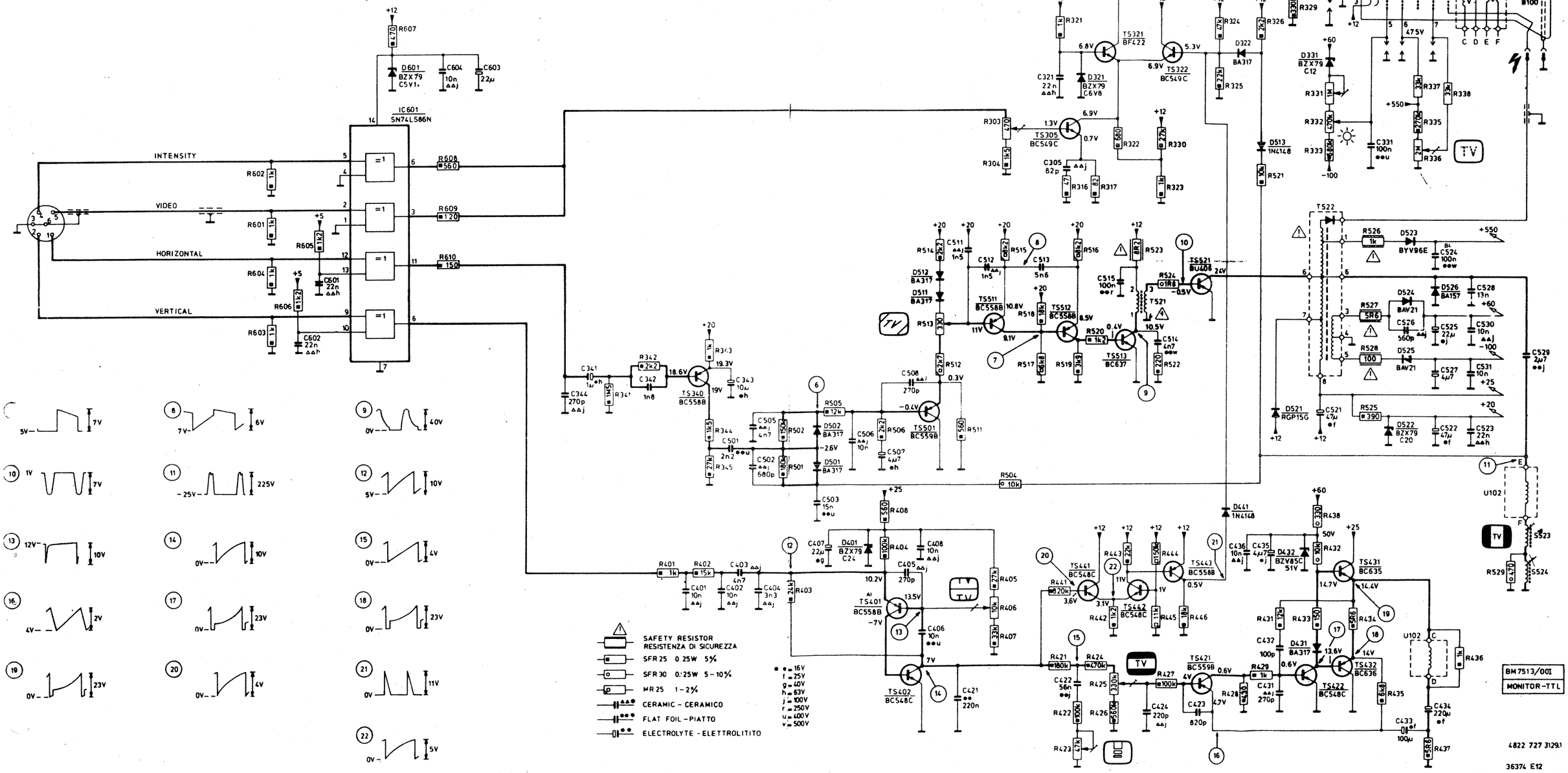
* • 16V
f 25V
h 63V
j 100V
r 250V
w 600V

AC DC

OSCILLOGRAMS: (PM5519)
GENERATOR ON GREY SCALE AND
VIDEO OUTPUT ADJUST ON 0.4Vpp

MAX. MAX.





BM7513/001	
MONITOR-TTL	

4822 727 31291

36374 E12

SUBJECT TO MODIFICATION - WIJZIGINGEN VOORBEHOUDEN - SAUF MODIFICATION - ANDERUNGEN VORBEHALTEN - SEGGETTO A MODIFICHE

2716-1 oder 2732 U3

74LS373 U4

8039H U2

CD 4514 U7

CD 4049UB U1

9,216 MHz

C3 4,7p C2 22p

XTAL1 XTAL2 EA GND SS VCC VDD

P27 P26 P25 P24 P15 P14 P13 P12 P11 P10

T1 INT

J5

4,7K R8 R9 R10 R7

D89 D90 D93 D94

C6 47p C5 47p C10 22µ R13 R14 22MΩ

DATA CLOCK CAPSLOCK NUMLOCK

7407 T16 T18 LD2 LD1 180Ω

J32 J10 J12

D86

R6 R5 R4 R3 R2 R1 6x10K

8039 LS373 +5V GND

10µ 0,1µ 0,1µ C7 C1 C4

J20 J21

FASTON PC BOARD FRAMING

alle DIODEN 1N4148

TASTEN 1-85

Index	Index hersteller	Datum	Name	Änderung

Zul. Abweichung für Maße ohne Toleranzangabe nach DIN				
Nennmaßbereich in mm	6	> 6 ... 30	> 30 ... 120	> 120 ... 315
fein	± 0,05	± 0,1	± 0,15	± 0,2
mittel	± 0,1	± 0,2	± 0,3	± 0,5
Winkel	± 2°	± 1°	Maße in Zeichnung eintr.	

Nennmaße (Grundmaße) beziehen sich auf die Länge des kürzeren Schenkels

Zul. Mittenabweichung IT 10

Werkmaß

Werkstoff: —— DIN

Abmessung —— DIN

Oberfl.: ——

gez.	18.12.1984	Zipfel G.
gepr.	18.12.1984	Zipfel
norm. gepr.		

G80-0499 COMMODORE 620-012131

Maßstab:

CHERRY-MIKROSCHALTER G. m. b. H. Industriestraße 19 8572 Auerbach/Opf.

Ers. f.

Ers. d.

Jeder Verwertung, auch durch dritte Personen zur Nachbildung oder zu anderen Zwecken, überlassen oder sonstwie unbefugt benutzt werden. (§ 826 BGB)

Lüfter ~3
Netz ~1
Netz ~2
Lüfter ~4
Si1
L1
C1
C4
C3
C2
VDR1
H1
Befestigungsschraube
GR1
C5
TR1
D1
R1
R2
PIN4
C6
R3
R18
DZ1
C8
R16
D7
R17
T2
R15
R12
C11
R21
D6
C12
R14
R13
R11
C9
IC1
R7
PIN8
PIN7
D2
C7
C13
PIN5
D4
R4
PIN3
T1
D5
R6
R5
C10
PIN 2,6,9
C14
R9
C16
R8
PIN1
R10
C18
IC2
C17
C15
R130
R131
T103
T104
R129
R128
R124
R119
R114
PIN 10/11
PIN 12
D101
D102
D103
L101
L102
L105
C111
C112
R133
R101
C113
T102
C114
C115
C116
R134
C117
TH101
R102
C118
C119
R132
C120
R103
C123
IC102
DZ102
DZ101
R115
T101
R116
R117
R118
R120
R121
C124
R111
R112
R113
R123
R122
C125
R105
R106
R107
R108
R109
C126
T105
R104
R127
R126
R125
R110
IC101
C122
CN1 PIN3
CN2 PIN1
CN3 PIN1
+12V
PIN15
PIN14
GL
CN1 PIN6
CN2 PIN4
CN3 PIN4
+5V
PIN17
PIN13
OVP
CN2 PIN4,5
CN3 PIN4,5
GND
CN1 PIN4,5
PIN16
CN1 PIN2
-12V
PIN15
+12V
PIN14
GL
PIN17
+5V
PIN13
OVP
CN1 PIN1 Power Good
PIN18
PIN16
GND

BV 223-5-04004

Werkstoff	Oberfläche	Gezeichnet	18.12.84	Br.
		Geprüft		

Maßstab

Stromlaufplan
120W - Schaltnetzteil VDE-Version

2-64-332

Schaffer

geändert, am 21.12.84 Sr.; 10.1.85 Sr.; 4.2.85 Sr.; 7.2.85 Sr.;

D Y S A N Fachhändler in Deutschland

BERLIN

SSB Software Studio
Tempelhofer Damm 157
1000 Berlin 42
Tel.: 030/7512089
(Kontakt: Hr. Fügart)

HAMBURG

Herz & Ervertz
Spaldingstr. 160 A
2000 Hamburg 1
Tel.: 040/232783
(Kontakt: Hr. Evertz)

SEELZE

Giesecke EDV-Zubehör
Am Kalkhofen 14/15
3016 Seelze 2
Tel.: 0511/402058/59
(Kontakt: Frau Giesecke)

HERNE

Jöllenbeck & Kasten
Forellstr. 120
4690 Herne 1
Tel. 02323/204-1
(Kontakt: Hr. Graus)

BOCHUM

Thomas Kleinfeld
Joachimstr. 16
4630 Bochum 1
Tel.: 0234/34387
(Kontakt: Hr. Kleinfeld)

BENSHEIM

Eckhard Balke
Ernst-Moritz-Arndt-Str. 12A
6140 Bensheim 3
Tel.: 06251/79832
(Kontakt: Hr. Balke)

KÖNIGSTEIN/TS.

Omnitek
Wiesbadener Str. 45
6240 Königstein/Ts.
Tel.: 06174/1779
(Kontakt: Hr. Dziubek)

MAINZ

Elphotec GmbH
Schießgartenstr. 7
6500 Mainz 1
Tel.: 06131/231947
(Kontakt: Hr. Staubitz)

SAARBRÜCKEN

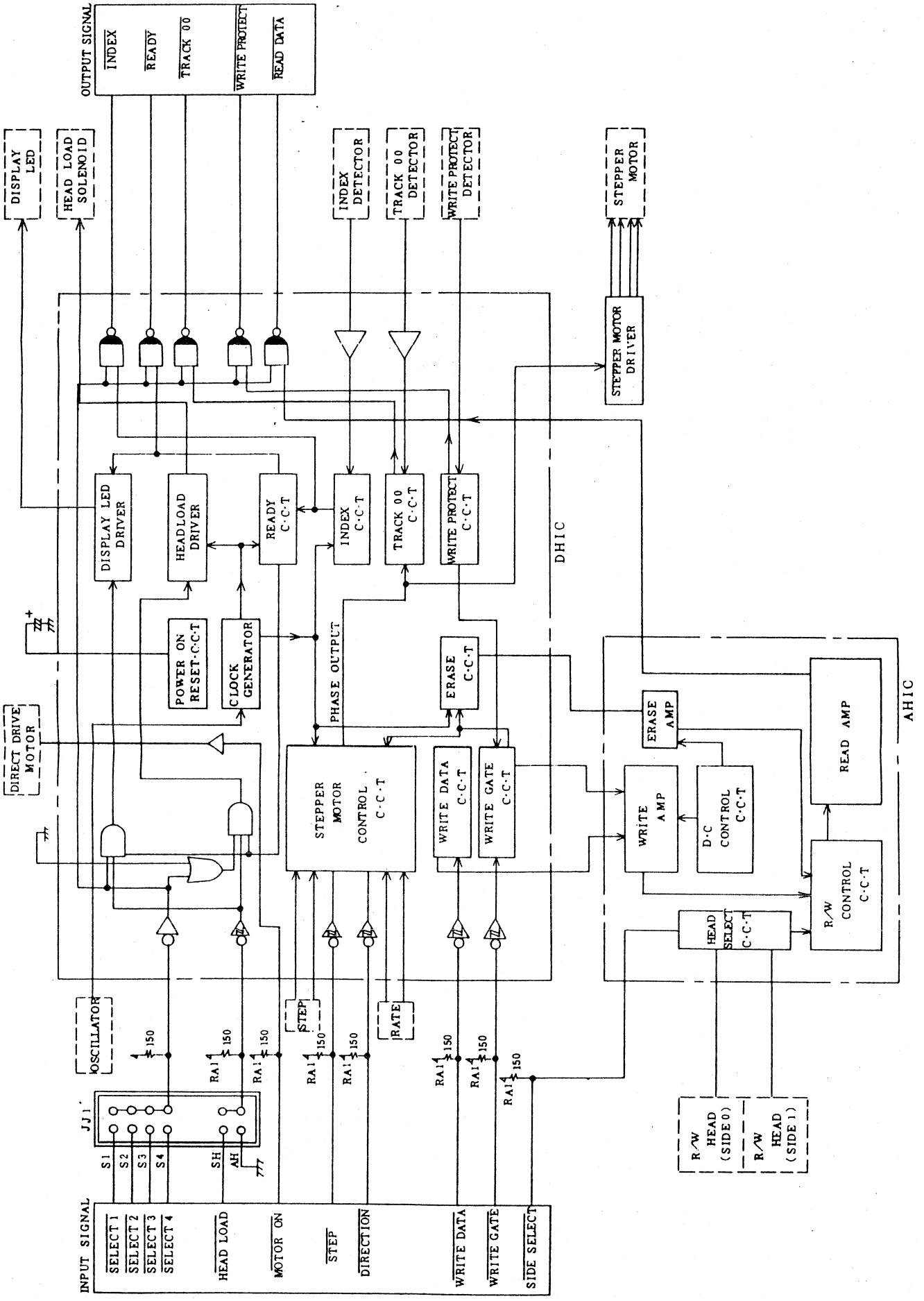
C.O.S.
Stengelstr. 2
6600 Saarbrücken
Tel.: 0681/52035
(Kontakt: Hr. Bender)

NÜRNBERG

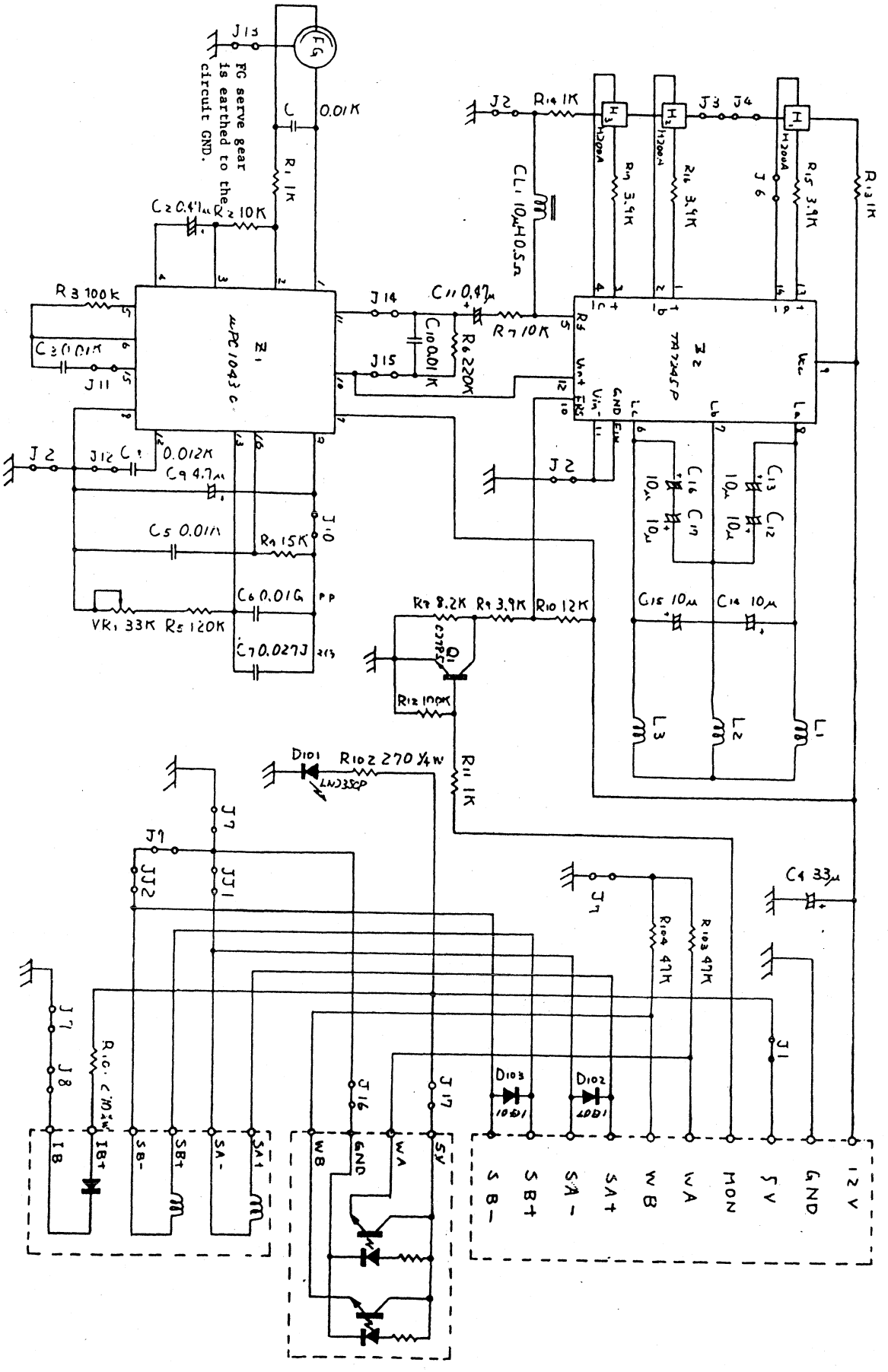
Habermann & Harder GmbH
Kirschgartenstr. 41
8500 Nürnberg 90
Tel.: 0911/37183
(Kontakt: Hr. Habermann)

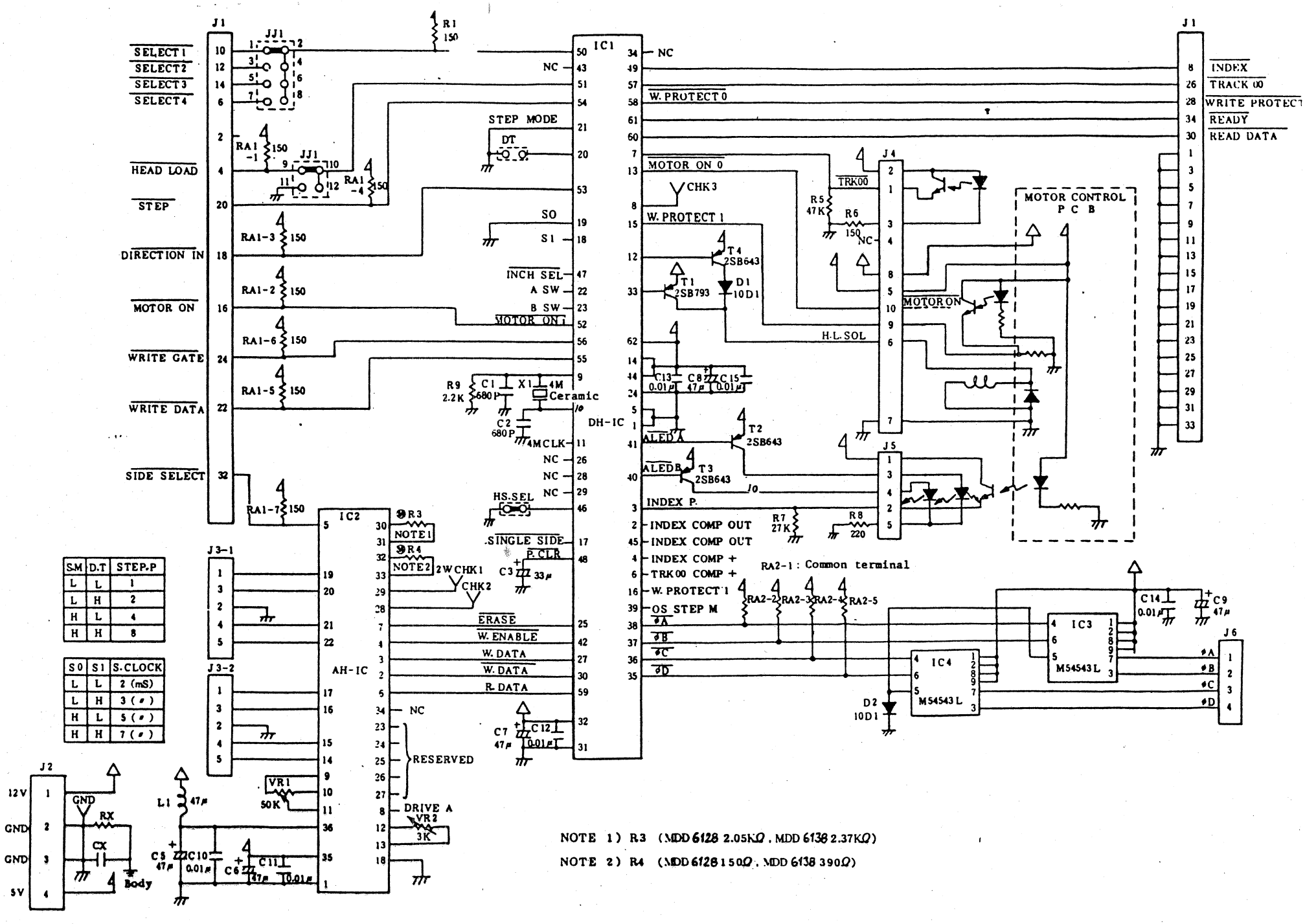
MÜNCHEN

Macrotron GmbH
Stahlgruberring 28
8000 München 82
Tel.: 089/4208-0
(Kontakt: Frau Harms)



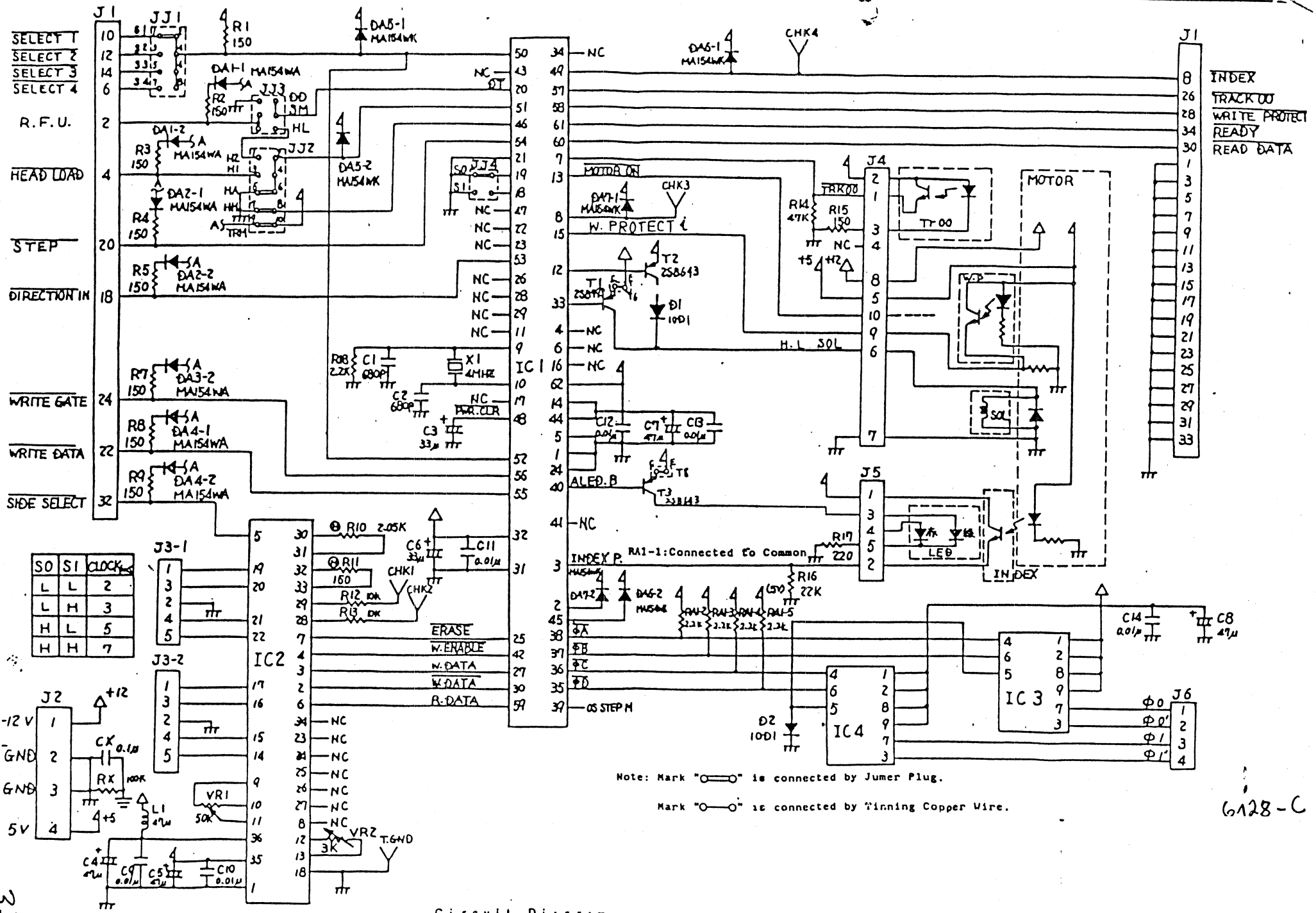
Circuit Block Diagram

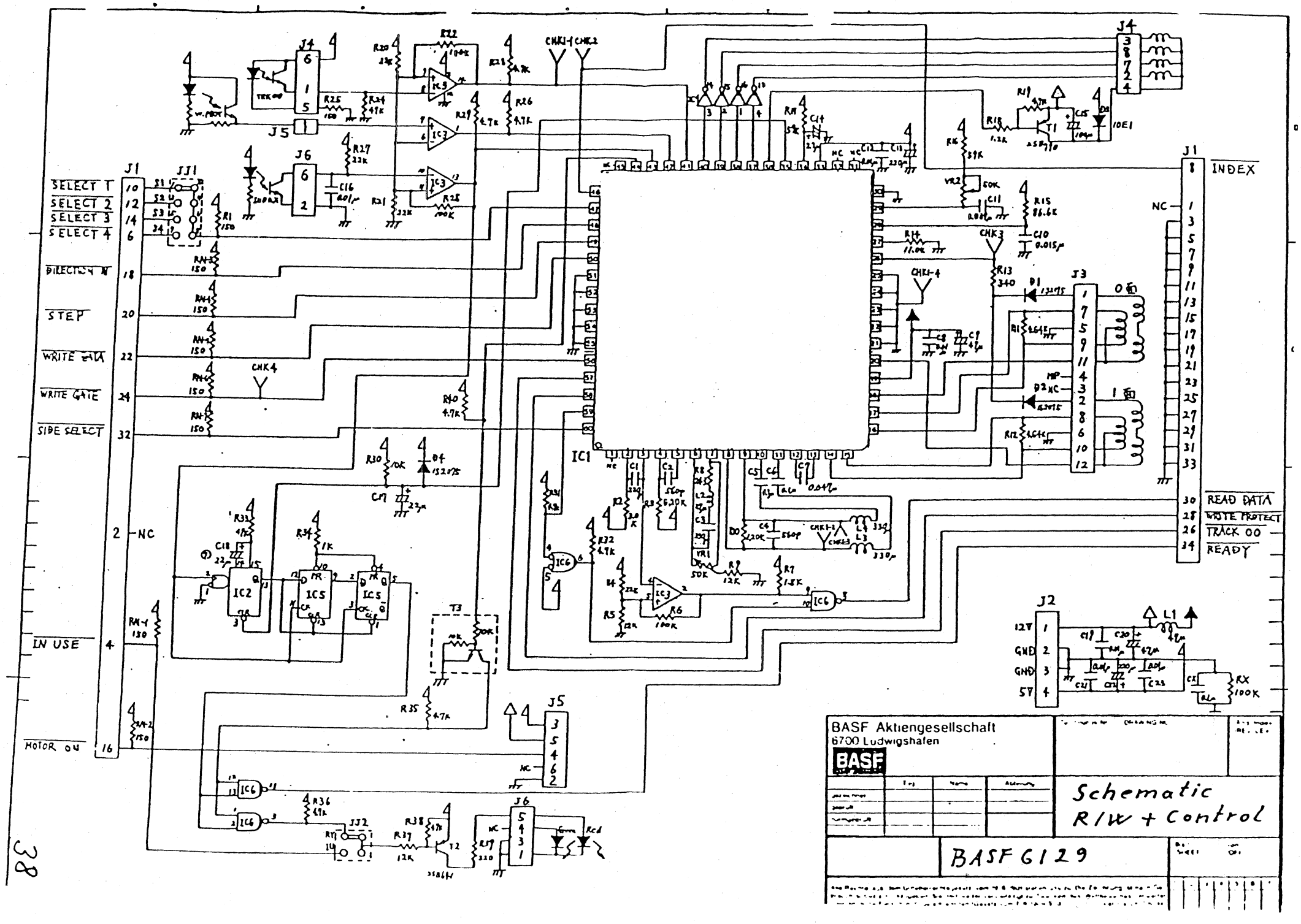

FG
J13
FG serve gear is earthed to the circuit GND.
0.01K
R1 1K
C2 0.47μ
R2 10K
R3 100K
C3 0.01K
J11
μPC1043c
Z1
J14
C11 0.47μ
C10 0.01K
R6 220K
J15
R7 10K
J2
R14 1K
C1 10μ 10.5m
H3 H3204
H2 H3204
H1 H3204
R4 3.9K
R4 3.9K
R15 3.9K
R13 1K
J3
J4
J6
TA7245P
Z2
Vout
Vin+
Vin-
GND
FIN
C13 10μ
C12 10μ
C16 10μ
C17 10μ
C15 10μ
C14 10μ
L1
L2
L3
J12
C8 0.012K
C9 4.7μ
C5 0.01μ
R9 15K
J10
C6 0.01G
PP
VR1 33K
R8 120K
C7 0.027J
R8 8.2K
R9 3.9K
R10 12K
Q1
2SC945
R12 100K
R11 1K
D101
R102 270 1/4W
LN1358P
J7
J9
JJ2
JJ1
C4 33μ
R104 47K
R103 47K
J1
J8
R.G. 270Ω 1/4W
IB
IB+
SB-
SB+
SA-
SA+
J16
J17
WB
GND
WA
5V
D103
D102
10D1
SB-
SB+
SA-
SA+
WB
WA
MON
5V
GND
12V



NOTE 1) R3 (MDD 6128 2.05KΩ, MDD 6138 2.37KΩ)

NOTE 2) R4 (MDD 6128 150Ω, MDD 6138 390Ω)


SELECT 1
SELECT 2
SELECT 3
SELECT 4
R.F.U.
HEAD LOAD
STEP
DIRECTION IN
WRITE GATE
WRITE DATA
SIDE SELECT
INDEX
TRACK 00
WRITE PROTECT
READY
READ DATA
MOTOR ON
W. PROTECT
H.L SOL
INDEX P.
ALED.B
ERASE
W.ENABLE
W.DATA
W.DATA
R.DATA
MOTOR
LED
INDEX
IC1
IC2
IC3
IC4
RA1-1:Connected to Common
Note: Mark "○═○" is connected by Jumer Plug.
Mark "○—○" is connected by Tinning Copper Wire.
6128-C
Circuit Diagram


SELECT 1
SELECT 2
SELECT 3
SELECT 4
DIRECTION IN
STEP
WRITE DATA
WRITE GATE
SIDE SELECT
IN USE
MOTOR ON
INDEX
READ DATA
WRITE PROTECT
TRACK 00
READY
BASF Aktiengesellschaft
6700 Ludwigshafen
Schematic
R/W + Control
BASF 6129

FORMAT 10 MB FESTPLATTE (HARDWARE)

WD CONTROLLER

```
DEBUG            ( CR )
-RAX             ( CR )
:0003            ( CR )
-G =C800:5       ( CR )
Y
```

XEBEC CONTROLLER

```
DEBUG            ( CR )
o322 00          ( CR )
o320 04          ( CR )
o320 00          ( CR )
o320 00          ( CR )
o320 00          ( CR )
o320 05          ( CR )
o320 07          ( CR )
```

SOFTWARE FORMAT

1) ERSTELLEN EINER NEUEN DOS PARTITION (CR) (CR) (CR) (ESC)

2) AKTIVIREN EINER PARTITION (1) (ESC) (ESC)

3) FORMAT C: /V/S

4) COPY *.* C:

REVISIONS				
REV	DESCRIPTION	DATE	BY	CHK
A	RELEASE FOR PRODUCTION PER E.O.#40250			
B	CORRECTED DRAWING ERRORS			
C	REVISED PER E.O.#40268			
D	REVISED PER E.O.#40269			
E	REVISED PER E.O.#530735			
F	REVISED PER E.O.#530636			
G	REVISED PER E.O.#530655			
H	REVISED PER E.O.#530730			
J	REVISED PER E.O.#530774			
K	REVISED PER E.O.#530791			
L	REVISED PER E.O.#530799			
M	REVISED PER E.O.#530817			
N	REVISED PER E.O.#530867			
P	REVISED PER E.O.#530891			
Q	REVISED PER E.O.#530927			
R	REVISED PER E.O.#530939			

DENOTES PIN X OF RESISTORS.

5. ALL CAPACITORS ARE IN MICROFARADS.
4. ALL UNVALUED COMPONENTS ARE OMITTED.
3. ALL DIODES ARE IN4446.
2. ALL RESISTORS ARE IN OHMS.
1. ALL RESISTORS ARE ± 5%, ¼ W.

NOTES UNLESS OTHERWISE SPECIFIED

210945-001	TM252		
NEXT ASSY	FIRST USE		
APPLICATION			

Tandon

TITLE: SCHEMATIC—TM252 DRIVE ELECTRONICS

D | 210940-XXX | REV R

DO NOT SCALE DRAWING

OCT 11 1984

REVISIONS				
REV	DESCRIPTION	DATE	BY	CHK	APPD
	SEE PAGE 1 OF 3				

-12VA +12VA +5V TP5 TP6 TP7 (R+) TP8 (R-)

L2 5UH L3 3.3UH C1 33PF C2 20PF C4 390 C26 .01 C27 .01 C3 .1 C5 .1 C7 .1 C8 .1

R16 1K R14 316 R15 316 R18 130 R17 1K R20 0 R21 698 R22 698 R23 220 R24 330

U8 592

U9 U10 U11 0116 10104 DS3486 2GLS31

R25 100 R26 100 R27 510 R28 100 (RT) W7

J2 +RD DATA -RD DATA

SRDT SHT.1,(C4) TP1

390PF 270PF 100 510 698 -5VD 1K 7.5K

J1C DIGITAL READ AUXILIARY

CR1 CR2 CR3 CR4 CR5

RP1 4.7K 5 PLCS RP1 4.7K (8)

C10 18PF Y1 5.898MHz C11 10

XTL1 XTL2 R3

INDEX SHT.4,(C4) DIR IN SHT.1,(C5) TI SHT.1,(B3) TRK 0 SHT.1,(A5) VDET SHT.1,(B5) SC SHT.1,(C5)

P17 P26 T1 P25 P24 INT RD WR PSEN ALE PROG SS VDD EA WUS DR SEL SHT.1,(D7) DR SLTD SHT.1,(C3)

8048

P16 P15 P13 P12 P11 DB0 DB1 DB2 DB3 P21 DB6 P23 P10 P14 DB4 T0 DB7 P20 DB5

#1 TRK FL #2 TEST #3 DIS SLIM #4 SEL SPIN #5 TRKS

P21 SHT.1,(D7) DB6 SHT.1,(C7) N/C W13 W14

Q1 2N4032 R29 22 2W R39 4.7K R41 470

U14 L293 VSS IN1 OUT1 CE1 IN2 OUT2 IN3 OUT3 CE2 IN4 OUT4

U15 U16 IN4001 4 PLCS

J8 REF STEP MOTOR BLU = + RED = ØA WHT YEL = ØB

U1 7414 U4 7406 U5 38

J1 -DI-TEST -FAULT

NOTES UNLESS OTHERWISE SPECIFIED

SIGNATURES DATE

Tandon CORPORATION

TITLE SCHEMATIC-TM252 DRIVE ELECTRONICS

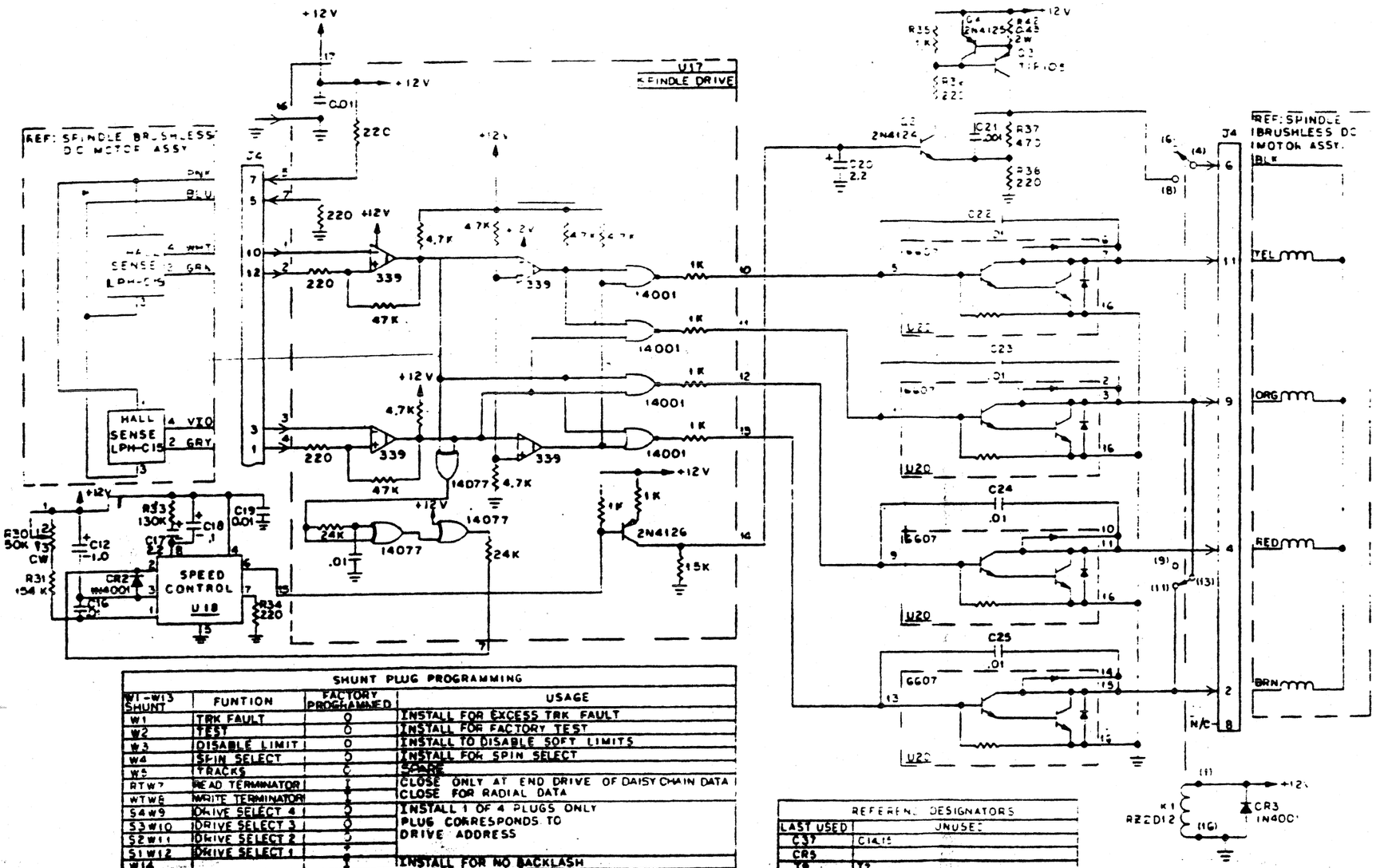
SIZE D DWG NO 210940 REV R

SCALE DO NOT SCALE DWG SHEET 2 OF 3

41

OCT 11 1984

REVISIONS				
REV	DESCRIPTION	DATE	BY	CHK	APPD
	SEE PAGE 1 OF 3				



SHUNT PLUG PROGRAMMING			
W1-W13 SHUNT	FUNTION	FACTORY PROGRAMMED	USAGE
W1	TRK FAULT	O	INSTALL FOR EXCESS TRK FAULT
W2	TEST	O	INSTALL FOR FACTORY TEST
W3	DISABLE LIMIT	O	INSTALL TO DISABLE SOFT LIMITS
W4	SPIN SELECT	O	INSTALL FOR SPIN SELECT
W5	TRACKS	O	CODE
RTW7	READ TERMINATOR	I	CLOSE ONLY AT END DRIVE OF DAISY CHAIN DATA
WTW8	WRITE TERMINATOR	I	CLOSE FOR RADIAL DATA
S4W9	DRIVE SELECT 4	O	INSTALL 1 OF 4 PLUGS ONLY
S3W10	DRIVE SELECT 3	O	PLUG CORRESPONDS TO
S2W11	DRIVE SELECT 2	O	DRIVE ADDRESS
S1W12	DRIVE SELECT 1	I	
W14		I	INSTALL FOR NO BACKLASH
W13		O	INSTALL FOR BACKLASH
W15	DRIVE SELECT	I	OPEN-ENABLES DRIVE TO CONTROLLER
W16	INDEX	I	LINES WHEN NOT SELECTED
W17	+5V TO J2-3	O	
U19	TERMINATOR PAK		

O = OMIT
I = INSTALL

REFERENCE DESIGNATORS	
LAST USED	UNUSED
C37	C14,15
CR5	
J9	J7
L5	
Q4	
R42	
RP1	
TP8	TP3
U21	
W17	W6
K1	

I.C. LOCATION AND VOLTAGE CHART				
LOCATION	TYPE	+5V	+12V	GROUND
U1	7414	14		7
U2	210933 HYBRID I.C.	19		18
U3	210932 HYBRID I.C.	8	5	7
U4	7406	14		7
U5	7438	14		7
U6	74S74	14		7
U7	DS3486	16		8
U8	592		6	3
U9	10116	1,16		6
U10	210534 HYBRID I.C.	12		10
U11	10104	1,16		8
U12	26LS31	16		8
U13	8048	26.40		20
U14	L293	16		8
U15	210936 HYBRID I.C.		12.463	
U16	210934 HYBRID I.C.			
U17	210935 HYBRID I.C.		15	14
U18	M51970L		4	5
U19	220/330 TERM PAK	16		8
U20	6607			16
U21	7406	14		7
RP1	4.7K RES-PAK	1		

NOTES: UNLESS OTHERWISE SPECIFIED

SIGNATURES	DATE
BY	
CHK	
ENG	
MFG	
QUAL	
MATL	

Tandon

TITLE
SCHEMATIC-TM252
DRIVE ELECTRONICS

SIZE D | DWG NO 210940 | REV R

SCALE | DO NOT SCALE DRAWING | SHEET 2 OF 3

42

Commodore

Rework des CPU Boards

Alle beschriebenen Umbauten sind auf den folgenden Seiten in das Leiterplatten-Layout eingetragen. Die Nummer der Änderung ist im Text und im Layout eingetragen. Das CPU-Board liegt für die Umbauten mit den Steckern zum I/O Board auf der rechten Seite.

Für die Durchführung erhalten Sie folgendes Material:

- 1 Wrap Draht 14 cm
- 1 Wrap Draht 17 cm
- 1 Widerstand 33 Ohm
- 1 Widerstand 820 Ohm
- 1 Kondensator 330 pF/ker.

1a) Es müssen folgende Leiterbahnen aufgetrennt werden:

Bestückungsseite: (A1) - Leiterbahn links neben U 39
(A2) - Masseverbindung von U 45 Pin 19
(A3) - Pin 18 von U45 von der Leiterplatte abtrennen und hochbiegen.

Lötseite: (A4) - Leiterbahn, die von U 58 Pin 8 nach links zu einer Durchkontaktierung führt.

1b) Es müssen folgende Verbindungen eingelötet werden:

Bestückungsseite: (A5) - Mit dem 14cm Draht U 45 Pin 18 und U70 Pin 9 verbinden.

Lötseite: (A6) - Mit dem 17cm -Draht U45 Pin 19 und den unteren Anschluß von R11 verbinden.
(A7) - Durch Verlöten werden Pin1 und Pin2 von U55 verbunden.

1c) Es müssen folgende Bauteile eingelötet werden:

(A8) - Der 33 Ohm Widerstand wird links von U 39 über der aufgetrennten Leiterbahn eingelötet.

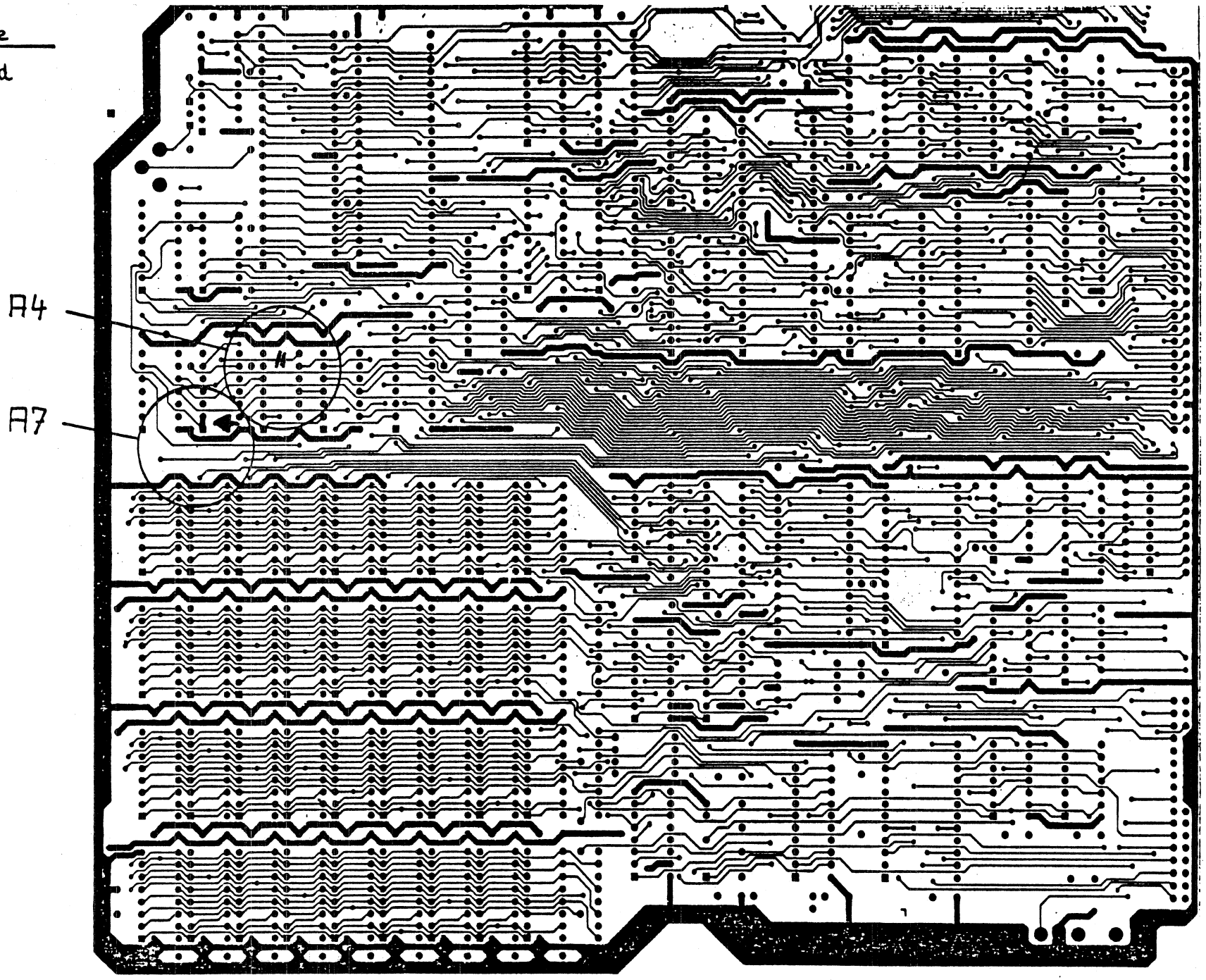
(A9)- Dear 330pF Kondensator wird an Pin 7 und Pin10 von U47 angelötet.

(A10) - Widerstand R3 (510 Ohm) auslöten und durch den 820 Ohm Widerstand ersetzen.

!! Auch auf guten Lötkontakt auf der Bestückungsseite achten.!

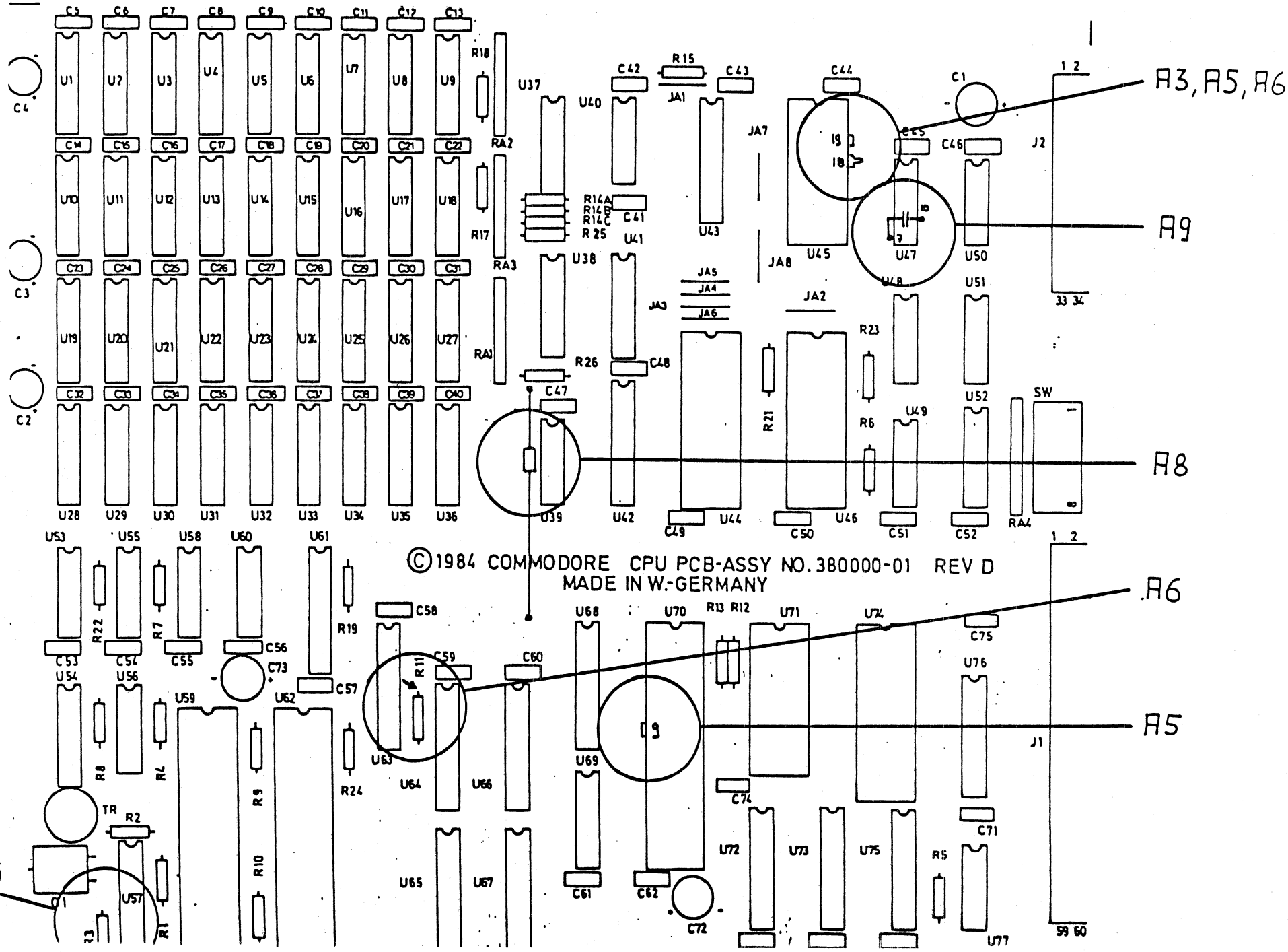
Solderside

CPU-Board



Component side

CPU-Board


A3, A5, A6
A9
A8
A6
A5
©1984 COMMODORE CPU PCB-ASSY NO. 380000-01 REV D
MADE IN W.-GERMANY

Commodore

Sales Support Information

Umbau PC-Monitor für Paradise- u. AGA-Karte	25.3.86 HB

Um bei älteren PC's die Paradise- oder AGA-Karte ohne Probleme nutzen zu können, sollte am PC-Monitor folgender Umbau vorgenommen werden:

Teil	alt	neu
R344	1K5	1K2
R405	27K	16K
R438	330R	820R o. 1K
R501	180K	150K
R505	12K	5K6
R514	2K2	2K
C403	4nF7	15nF
C507	4µF7	1µF
C528	13nF	10nF +/- 5%, 400 V DC, -40°C bis +85°C
D441	1N4148	Entfernen

Justagen:

a) OHNE RECHNER! Mit R106 die +12V auf 11.65V regeln.

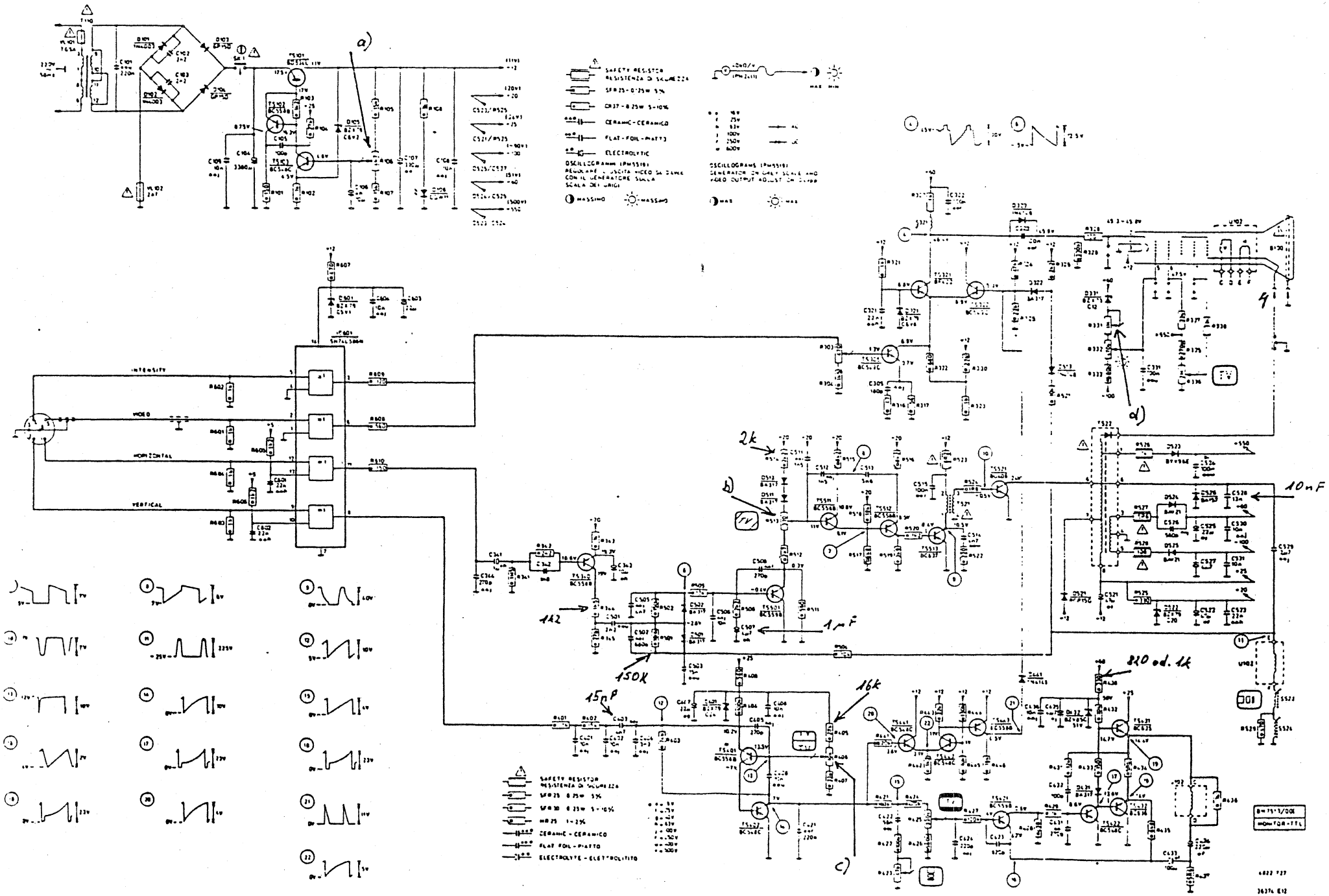
b) Rechner anschliessen und 80x25 Emulation Text-Mode einstellen. Mit R513 den "horizontal hold" einstellen.

c) 320x200 Graphik-Mode einstellen und mit R406 "vertical hold" justieren.

d) Die externen Brightness und Kontrastregler auf maximum stellen. Mit R331 solange regeln, bis in einem normal beleuchteten Raum der horizontale Rücklaufstrahl gerade zu sehen ist.

e) Mit den Reglern auf der Rückseite, die Breite und Höhe wie folgt einstellen:
Breite 215mm bis 225mm
Höhe 160mm bis 170mm

Hartmut Bützer
Sales Support
Systeme


a)
b)
c)
d)
2k
10nF
1nF
150K
15nF
16k
220 od. 1k
INTENSITY
VIDEO
HORIZONTAL
VERTICAL
SAFETY RESISTOR
RESISTENZA DI SICUREZZA
CERAMIC - CERAMICO
FLAT FOIL - PIATTO
ELECTROLYTIC
ELECTROLYTE - ELETTROLITICO
MASSIMO
OSCILLOGRAMS (PM5519)
GENERATOR ON GREY SCALE AND
VIDEO OUTPUT ADJUST ON MAX
BM7511/00E
MONITOR-TTL

CS 96 653

Commodore

Sales Support Information

FTZ-Nummern für PC 10/20	1.4.86 HB

Nachfolgend eine Aufstellung der uns bekannten FTZ-Nummern für den PC und deren Inhaber.

Nr.: 04362D
Inhaber: COMMODORE Büromasch.
Erlaubte Anschlüsse: Duplex asynchron
Direktrufnetz (Standleitung) 300 u. 1200 Baud
Fernsprechnetz 300 u. 1200 Baud
Datex-L 300 Baud
Datex-P 300 u. 1200 Baud
SDLC synchron mit IBM SDLC-Adapter
Direktrufnetz 1200, 2400, 4800, 9600 Baud
Fernsprechnetz 1200, 2400, 4800 Baud
Datex-L 2400, 4800, 9600 Baud

Nr.: 04602D
Inhaber: Dr. W. Stopp, Stiftshof 10, 7150 Backnang, 07191/8158
Erlaubte Anschlüsse: Modem MDB 1200-01 (Einschubmodem)

Nr.: 04353D
Inhaber: Exycon, Grunerstr. 46, 4000 Düsseldorf, 0211/632083
Erlaubte Anschlüsse: Asynchron Datex-L 2400 Baud

Nr.: 02786D
Inhaber: DeTeWe, Wrangelstr. 100, 1000 Berlin 30, 030/61041
Erlaubte Anschlüsse: Teletex

Nr.: 02498D
Inhaber: Com-M-Tex AG,Auenstr. 25, 8000 München, 089/2013984
Erlaubte Anschlüsse: Telex

Nr.: 07169D (in Vorbereitung)
Inhaber: isi Computer GmbH, Otto-Hahn-Str. 34, 8012 Ottobrunn, 089/600100
Erlaubte Anschlüsse: BTX

Commodore

1901 Monitor an PC

Der 1901 Farbmonitor des 128 läßt sich auch an einem PC mit AGA-Karte betreiben.

Der Anschluß erfolgt mit der beigelegten Videoleitung des 1901.

1. Hardwaremäßiges Festlegen des Colormode

Dip-Schalter 5 des SW1 auf der CPU-Platine ist auf ON zu stellen.
Der AGA-Dip sieht wie folgt aus:

1	2	3	4	5	6	7	8	
off	on	on	off	on	off	on	on	(Color Text 80 x 25)

Testen des Color Mode mit dem Programm AGA-Test

2. Softwaremäßiges Umschalten monochrom/color-mode

Softwaremäßiges Umschalten von dem Monchrom-Mode in den Color-Mode erfolgt mit dem Programm Vset.

Color Text 80 x 25 wählen (7) und den Anweisungen des Programms folgen.

Hierzu ist keine Veränderung eines Dip-Switches nötig.

Testen des Color-Mode mit dem Programm AGA-Test.

Axel Krämer
Techn. Schulung

1. DIAGNOSTIC

1.1 DIAGNOSTIC I/O-Board

1.2 DIAGNOSTIC Video-Board

1.3 SYSTEM-DIAGNOSTIC

1.1 DIAGNOSTIC I/O-Board

Die I/O-DIAGNOSTIC testet folgende Baugruppen des PC10/PC20:

- Keyboard-Interface
- Disketten-Interface
- Parallel-Interface
- Seriell-Interface

Die Diagnostic-Software wird in zwei Versionen geliefert:

A : Als ROM-Software auf dem Diagnostic-Board zum Einstecken in einen Extension-Slot des PC10/PC20.
B : Als Programm auf der I/O-DIAGNOSTIC Diskette.

Beide Versionen werden automatisch vom PC-BIOS gestartet. Die ROM-Version wird durch die Rom-Search-Routine des BIOS gefunden und gestartet, die Disk-Version wird nach der System-Initialisierung automatisch von der Diskette geladen und gestartet.

Zum Testen der Parallel- und Seriell-Ports werden zwei Jumper mit den folgenden Kurzschlußbrücken benötigt :

- Parallel-Port-Jumper : 1 - 13
  2 - 15
  10 - 16
  11 - 17
  12 - 14

- Seriell-Port-Jumper : 1 - 7
  2 - 3
  4 - 5 - 8
  6 - 20

Testvorbereitung:

- PC10/PC20 in Standard-Konfiguration (ohne Erweiterungen)
- I/O-DIAGNOSTIC Diskette in Laufwerk A einlegen
- SYSTEM-DIAGNOSTIC Diskette in Laufwerk B einlegen
- Jumper auf Parallel- und Seriell-Port aufstecken
- (Diagnostic-Board in einen der Slots stecken)

Testdurchführung:

Nach dem Starten der Diagnostic muß das Keyboard entfernt werden, um ein Testen der Keyboardschnittstelle zu ermöglichen. (Das Keyboard selber wird beim Power-Up des PC10/PC20 getestet.) Die Diagnostic startet nun den Test der I/O-Board-Baugruppen, dessen Ablauf auf dem Monitor verfolgt werden kann. Dabei werden alle Testschritte im folgenden Format dargestellt:

Testcode, Baugruppe, Testergebnis, (Fehlerstatus)

Der nur im Fehlerfall ausgegebene Fehlerstatus besteht aus dem Fehlercode, der auch auf dem Diagnostic-Display ausgegeben wird, und dem eigentlichen Status der getesteten Baugruppe, der im folgenden weiter spezifiziert wird. Der gesamte Fehlerstatus kann so als Fehler-Kurzmeldung für weitere Analysen in einer Log-Datei gespeichert werden.

Nach etwa zwei Minuten ist ein Diagnosticlauf beendet und nach Ausgabe einer Abschlußmeldung startet das Programm erneut. Dieser Dauertest kann nur durch das Abschalten des Systems abgebrochen werden.

Folgende Tests werden während eines Laufes durchgeführt :

1.1.1. Keyboard-Interface:

Fehlercode : "AA"

Test : Bei abgezogenen Keyboard wird das Keyboard-Latch sieben mal getaktet und so mit sieben "1" = FE hex gefüllt. Danach das Keyboard-Latch gelesen und auf "FE" geprüft.

Fehlerstatus : Latch-Inhalt, wenn nicht FEH.

Fehlercode : "AB"

Test : Ist das Keyboard-Latch gefüllt, wird ein Interrupt erzeugt, dessen Auftreten getestet werden kann.

Fehlerstatus : CPU-Register 'AH' nach dem Interrupt

1.1.2. Floppydrive-Interface:

Fehlercode : "D1" o. "D2" für Drive A und Drive B

Test :
- Reset FDC
- Linear Seek
- Random Seek
- Read-Test
- Write/Verify-Test

Fehlerstatus :
80H - Time Out
40H - Bad Seek Operation
20H - Bad FDC
10H - Bad CRC on Read
09H - DMA Boundary across 64K
08H - DMA Overrun
04H - Sector not found
03H - Write protect
02H - Address mark not found
01H - Bad command

1.1.3. Parallel-Interface:

Fehlercode : "E7"
Test : R/W-Test des Daten-Registers
Testmuster FFH...00H
Fehlerstatus : FFH - Bad Compare

Fehlercode : "E8"

Test : Testet die Handshake-Leitungen mit Hilfe des Jumpers.
Fehlerstatus : 07H - Error Line (Bit3)
50H - Select Line (Bit4)
60H - Paper-empty Line (Bit5)
00H - Acknowledge Line (Bit6)
C0H - Busy Line (Bit7)

Fehlercode : "E9"
Test : Durch eine Jumperverbindung kann durch Setzen von Bit2 des Printer-Kontroll-Registers ein Interrupt ausgelöst werden, dessen Funktion getestet wird.
Fehlerstatus : CPU-Register 'AH' nach dem Interrupt

1.1.4. Seriell-Interface:

Fehlercode : "EA"
Test : Tranfer von 256 Testbytes über Transmitter - Jumper - Receiver mit unterschiedlichen Übertragungsformaten.
1. 1200 Bd; odd Parity; 1 Stop; 8 Daten
2. 9600 Bd; even Parity; 2 Stop; 7 Daten
Fehlerstatus : 80H - Time Out
40H - Transmitter shift register empty
20H - Transmitter holding register empty
10H - Break detected
08H - Framing Error
04H - Parity Error
02H - Overrun Error
01H - Data not ready

1.2 DIAGNOSTIC Video-Board

Die VIDEO-DIAGNOSTIC ist als Programm auf der I/O-DIAGNOSTIC Diskette vorhanden und kann von dort gestartet werden.

Testvorbereitung:

- System mit DOS-Diskette in Drive A initialisieren

Testdurchführung:

- I/O-DIAGNOSTIC Diskette in Drive B einlegen
- "B:VDIAG <Return>" eingeben

Testablauf:

Nach dem Start der Video-Diagnostic wird der Bildschirm gelöscht und der das erste Testbild dargestellt. Durch Drücken einer Taste kann von einem Testbild ins andere gesprungen werden. Durch zweimaliges Drücken einer Taste kann die Video-Diagnostic verlassen werden.

Folgende Testbilder können aufgerufen werden :

1. PC10/PC20 Character Set
2. Darstellung aller möglichen Attribute mit freigegebenen Blinkmodus
3. wie 2. jedoch mit gesperrtem Blinkmodus
4. R/W-Test des Video-RAMs ($B0000-B3FFF)

1.3 SYSTEM-DIAGNOSTIC

Die SYSTEM-DIAGNOSTIC dient zum Testen aller Komponenten des PC10/PC20. Alle Tests können hintereinander oder einzeln, einfach oder mehrfach ausgeführt werden. Die Auswahl der Tests und ihre Wiederholungen werden menuegesteuert eingegeben. Alle Testergebnisse werden in einem Log-File abgespeichert und können nach Ablauf der System-Diagnostic auf dem Bildschirm oder einem Drucker ausgegeben werden.

Folgende Tests sind in der System-Diagnostic enthalten:

- System-Switch, System-Port, System-Timer
- RAM
- Keyboard
- Floppy-Disk-Laufwerke
- Harddisk-Laufwerk
- Parallel-Port
- Seriell-Port
- Video-Interface

Testvorbereitung:

- System ausschalten
- SYSTEM-DIAGNOSTIC-Diskette in Laufwerk A einlegen
- I/O-DIAGNOSTIC oder 2. SYSTEM-DIAGNOSTIC Diskette in Laufwerk B einlegen
- Jumper auf Parallel- und Seriell-Port aufstecken

Testdurchführung:

- System einschalten
- Steuerung der Testschrite über das Menue

Testablauf:

Die Steuerung der SYSTEM-DIAGNOSTIC erfolgt über drei Menues, die im folgenden beschrieben werden.

1.Menue - Diagnostic-Mode:

F1 - Alle Tests - bis auf den Videotest - werden in einer Schleife durchlaufen.
F2 - Aufruf des 2.Menues.
F9 - Das Logfile auf der in Laufwerk A eingelegten Diskette wird gelöscht, d.h. alle Einträge werden Null gesetzt.
F10 - Das Logfile auf der in Laufwerk A eingelegten Diskette wird auf dem Monitor ausgegeben und kann mit "Print-Screen" - Anweisung (Shift/PrtSc) auf einem angeschlossenem Drucker ausgegeben werden.

Hinweis: Die Menuepunkte F9 und F10 sind nicht nur für die SYSTEM-DIAGNOSTIC nutzbar, sondern ermöglichen ebenso die Behandlung von Logfiles, die z.B. vom SYSTEM-BURNIN erstellt wurden.

2.Menue - Test-Mode:

F1 - System-Port : s. Seite 9, 1.3.1.
F2 - System-Ram : s. Seite 9, 1.3.2.
F3 - Keyboard : s. Seite 9, 1.3.3.
F4 - Floppy-Drive A : s. I/O-DIAGNOSTIC Seite 4, 1.1.2.
F5 - Floppy-Drive B : s. I/O-DIAGNOSTIC Seite 4, 1.1.2.
F6 - Harddisk : s. Seite 10 1.3.4
F7 - Parallel-Port : s. I/O-DIAGNOSTIC Seite 5, 1.1.3.
F8 - Serial-Port : s. I/O-DIAGNOSTIC Seite 5, 1.1.4.
F9 - Videocard : s. VIDEO-DIAGNOSTIC Seite 6, 1.2.
F10 - Rückkehr zum 1.Menue.

3.Menue - Execution-Mode:

F1 - Ausgewählte Tests werden in einer Endlosschleife durchlaufen. ACHTUNG: Abruch nur durch Ausschalten des Systems möglich !
F2 - Ausgewählte Tests werden einmal ausgeführt. Danach Rückkehr zum 1.Menue.
F3 - Ausgewühlte Tests werden mehrfach durchlaufen. Die Anzahl der Tests kann 1...9999 betragen. Die Eingabe kann mit <Backspace> korrigiert werden und wird mit <Return> abgeschlossen. Sind alle Wiederholungen ausgeführt erfolgt der Rücksprung zum 1.Menue.
F10 - Rückkehr zum 1.Menue ohne einen Test auszuführen.

1.3.1. System-Switch, -Port, -Timer

Testcode	:	"22"
Test	:	Lesen des Dip-Switch und vergleichen mit der Default-Einstellung.
Fehlerstatus	:	Gesetzte Bits geben Position von fehlerhaften Schaltern wieder.

Testcode	:	"23"
Test	:	Überprüfung der Timer-Freigabeleitung GATE2 mit Hilfe des System-Ports.
Fehlerstatus	:	00 - OK ; FF - Fehler.

1.3.2. System-Speicher

Testcode	:	"68"
Testmuster	:	Bank# + Adress#
Testbereich	:	$10000H...$9FFFFH
Test	:	Adress-Test Muster werden in Testbereich geschrieben, zurückgelesen und verglichen.
Fehlerstatus	:	1.Byte Fehlersegment 2.Byte Fehleradresse

Testcode	:	"6B"
Test	:	R/W-Test
Testmuster	:	00H, 55H, AAH, FFH
Testbereich	:	$10000H...$3FFFFH (256kB)
Fehlerstatus	:	1.Byte Fehlersegment 2.Byte Fehleradresse

1.3.3. Keyboard

Testcode	:	"AC"
Test	:	Keyboard-Reset; Erwartet 'AA' vom Keyboard
Fehlerstatus	:	FFH - Keyboard sendet 'AB' => Fehler XXH - Keyboard sendet 'AA'+'XX' => XX - Scancode einer def. Taste

1.3.4. Harddisk (nur PC20)

Testcode : "C2"
Test :
- read harddisk parameters
- reset controller
- linear seek cylinder 0...max. cyl.
- random seek (30 times)
- read data from every seventh cylinder
- controller ram diagnostic
- drive diagnostic
- controller internal diagnostic

Fehlerstatus:
FFH - Sense operation failed
CCH - Controller ram error
BBH - Undefined error occured
80H - Time out
40H - Bad seek operation
20H - Bad HDC
11H - ECC corrected data
10H - Bad ECC on read
0BH - Bad track flag detected
09H - DMA boundary across 64K
07H - Drive parameter aktivity failed
05H - Reset failed
04H - Sector not found
02H - Address mark not found
01H - Bad command

Ersatzteilkatalog

Spare parts catalogue
Catalogue de piecès de rechange
Catálogo de Repuestos

commodore

PC 10

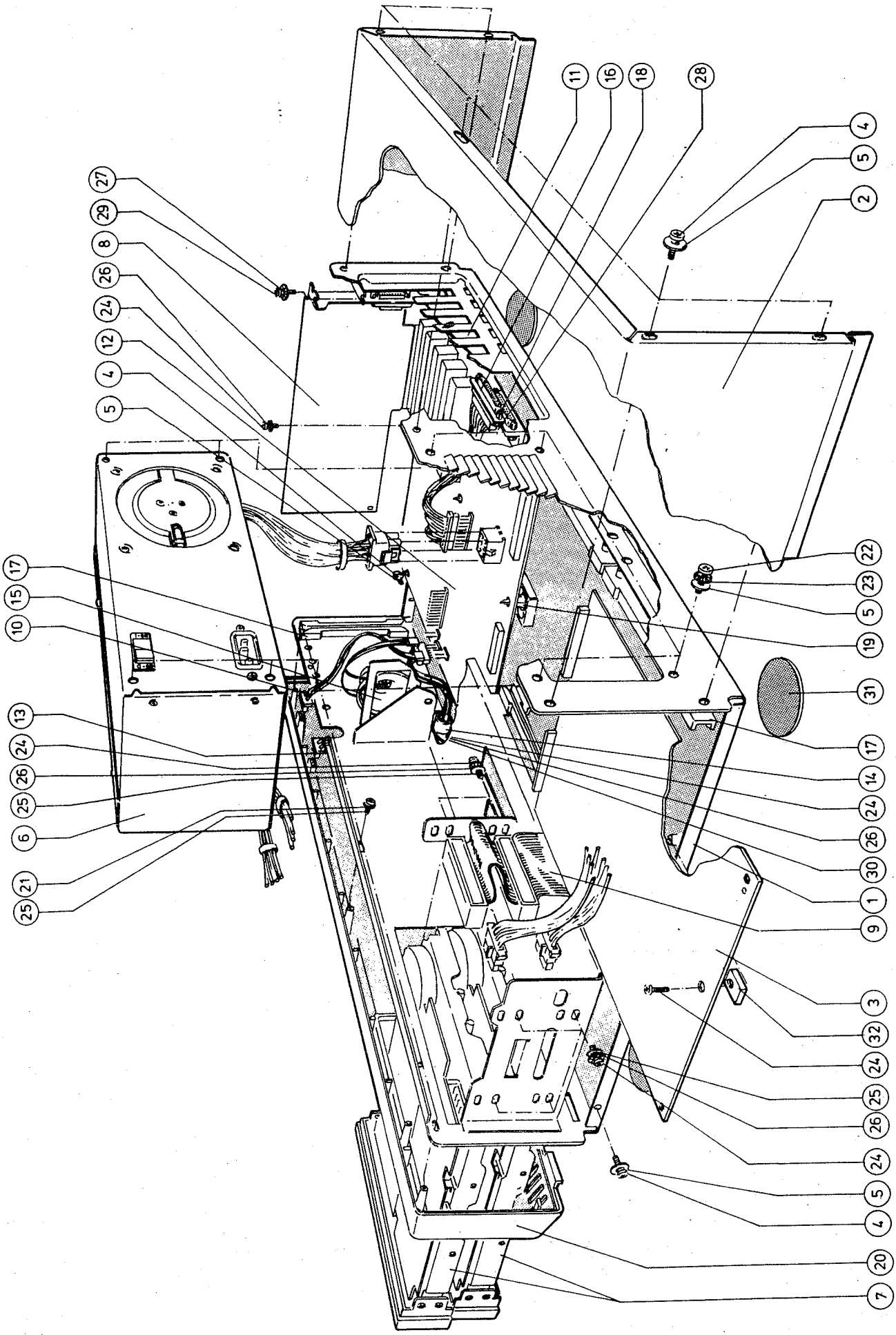
PC 20

commodore
COMPUTER

PC 10 CPU MAIN ASSY

Position Position Position Posición	Benennung Term Désignation Denominación	Ersatzteilnummer Spare Parts No. No. de pieces de rechange No de requesto
1	Housing, Bottom	380100-01
2	Housing, Top	380101-01
3	CPU PCB Assy	380000-01
4	7 x Screw, M4x8mm DIN 7958	906810-01
5	11 x Washer Flat Ø 4,3 DIN 125	907272-06
6	Power Supply, VDE/BSI	380021-01
	Power Supply, UL	380021-02
7	2 x Floppy Disk Drive	380111-01
8	Monochrome Video PCB Assy	380003-01
9	Drive Cable Assy	380012-02
10	Power On LED Assy	380016-01
11	4 x Extension Card Panel	380120-01
12	I/O PCB Assy	380001-01
13	Harddisk LED Assy	380020-01
14	Keyboard Cable Assy I	380017-01
15	Speaker Assy	8256099-03
16	RS 232 Cable Assy	380014-01
17	9 x Guide-PCB	251118-01
18	4 x Stand Off	380121-01
19	8 x Stand Off	380122-01
20	Front Panel	380102-01

Position Position Position Posición	Benennung Term Désignation Denominación	Ersatzteilnummer Spare Parts No. No. de pieces de rechange No de requesto
21	3 x Screw, self tapping, 2,9 x 9,5 mm DIN 7981	906883-04
22	14 x Screw M4x5mm DIN 7985	906810-09
23	14 x Lockwasher Ø 4,3 ext. tooth DIN 6797	905655-04
24	11 x Screw M3x8mm DIN 7958	906800-03
25	9 x Washer Flat Ø 3,2 DIN 125	907272-02
26	9 x Lockwasher Ø 3,2 ext. tooth DIN 6797	905652-04
27	5 x Lockwasher Ø 3,7 ext. tooth DIN 6797	905650-07
28	2 x Kep Nut 4-40*	905970-05
29	5 x Screw M3 x5mm DIN 7985	324465-01
30	2 x Nut M3 DIN 934	905960-03
31	4 x Foot, self adhesive	380128-01
32	1 x Distance Plate, Trovidur	380115-01

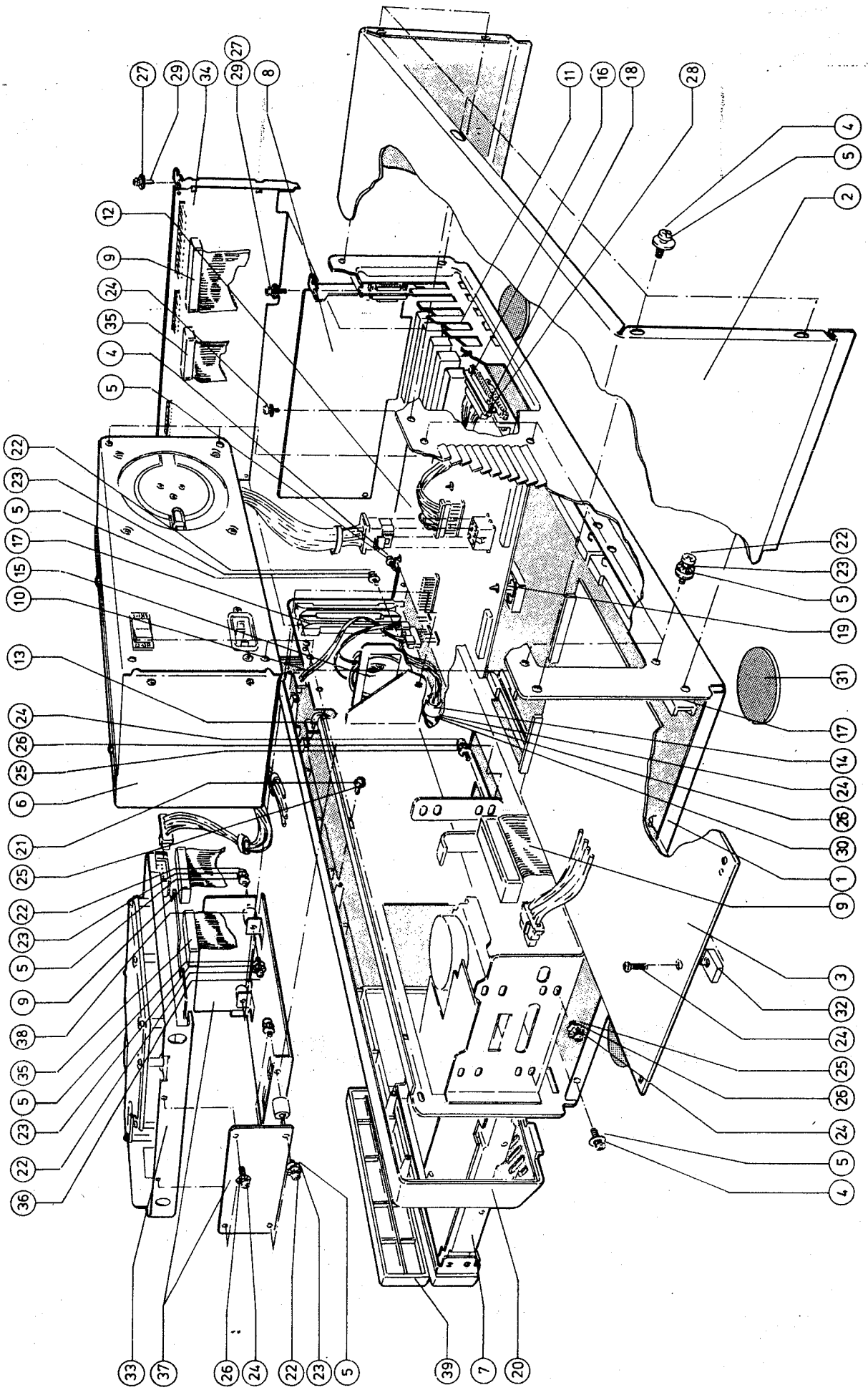

11
16
18
28
4
5
2
27
29
8
26
24
12
4
5
17
15
10
13
24
26
25
6
21
25
22
23
5
19
31
17
14
24
26
30
1
9
3
32
24
25
26
24
5
4
20
7

PC 2 CPU MAIN ASSY

Position Position Position Posición	Benennung Term Désignation Denominación	Ersatzteilnummer Spare Parts No. No. de pieces de rechange No de requesto
1	Housing, Bottom	380100-01
2	Housing, Top	380101-01
3	CPU PCB Assy	380000-01
4	7 x Screw, M4x8mm DIN 7958	906810-01
5	21 x Washer Flat Ø 4,3 DIN 125	907272-06
6	Power Supply, VDE/BSI	380021-01
	Power Supply, UL	380021-02
7	Floppy Disk Drive	380111-01
8	Monochrome Video PCB Assy	380003-01
9	Drive Cable Assy	380012-02
10	Power On LED Assy	380016-01
11	3 x Extension Card Panel	380120-01
12	I/O PCB Assy	380001-01
13	Harddisk LED Assy	380020-01
14	Keyboard Cable Assy I	380017-01
15	Speaker Assy	8256099-03
16	RS 232 Cable Assy	380014-01
17	9 x Guide-PCB	251118-01
18	4 x Stand Off	380121-01
19	8 x Stand Off	380122-01
20	Front Panel	380102-01

Position Position Position Posición	Benennung Term Désignation Denominación	Ersatzteilnummer Spare Parts No. No. de pieces de rechange No de requesto
21	3 x Screw, self tapping, 2,9 x 9,5 mm DIN 7981	906883-04
22	4 x Screw M4x5mm DIN 7985	906810-09
23	14 x Lockwasher Ø 4,3 ext. tooth DIN 6797	905655-04
24	10 x Screw M3x8mm DIN 7958	906800-03
25	9 x Washer Flat Ø 3,2 DIN 125	907272-02
26	9 x Lockwasher Ø 3,2 ext. tooth DIN 6797	905652-04
27	5 x Lockwasher Ø 3,7 ext. tooth DIN 6797	905650-07
28	2 x Kep Nut 4-40"	905970-05
29	5 x Screw M3 x5mm DIN 7985	324465-01
30	2 x Nut M3 DIN 934	905960-03
31	4 x Foot, self adhesive	380128-01
32	1 x Distance Plate, Trovidur	380115-01
33	Hard Disk Drive	380112-01
34	Hard Disk Controller Card	380113-01
35	Hard Disk Cable Assy	380013-01
36	Hard Disk Subchassis	380124-01
37	2 x Hard Disk Holding Plate	380125-01
38	4 x Shock Absorver, Rubber	380123-01
39	Shutter Cover, Floppy	380119-01

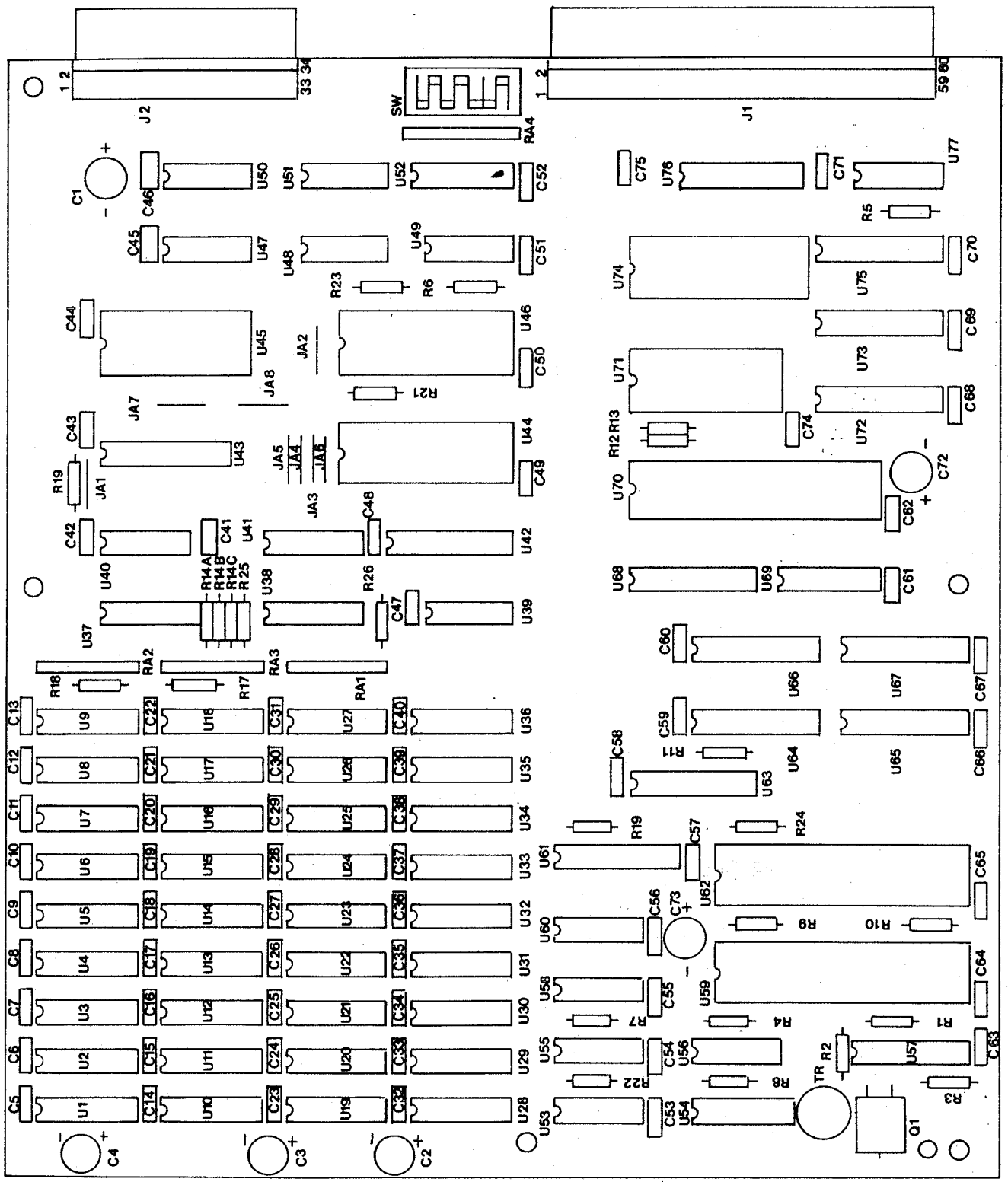
09


27 29 34 29 27 8 11 16 18 28
4 5 2
12 9 24 35 4 5
22 23 5 17 15 10 13 24 26 25 6 21 25 22 23 5 9 38 35 5 23 22 36
22 23 5 19 31 17 14 24 26 30 1 9 3 32 24 25 26 24 5 4
33 37 26 24 22 23 5 39 7 20

PC 10/20 CPU PCB ASSY (LAYOUT OF COMPONENTS)

Schaltbildangabe / Circuit diagram information / Repère schéma / Designacion del diagrama de circuito	Benennung / Term / Désignation / Denominacion	Ersatzteilnummer / Spare Parts No. / No. de Pieces de rechange / No de requesto
U59	IC 8088 CPU 5MHz	380200-01
U62	IC 8087 CO-PROCESSOR 5MHz	380201-01
U57	IC 8284A CLK-GENERATOR 5MHz	901875-01
U61	IC 8288 BUS-CONTROLLER 5MHz	901876-01
U74	IC 8259A INTERRUPT-CONTR. 5MHz	901874-01
U71	IC 8253A-5 TIMER 5MHz	380202-01
U70	IC 8237A-5 DMA-CONTROLLER 5MHz	380203-01
U1-18	IC 4228-NL3 128Kx1 BIT DRAM	380222-01
	IC 4228-NL4 128Kx1 BIT DRAM	380222-02
U1-9	IC 4256 256Kx1 BIT DRAM	380223-01
U44	IC 2364 8K-ROM	
	IC 2764 8K-EPROM"Bios"	380204-01
U43	IC N82S153 FPLA	380211-03
	IC 16L8 PLA	380211-04
U46	IC 7700 PLA	
	IC N82S100 FPLA	380212-01
U45	IC 74154 DECODER	901522-13
U40	DIGITAL DELAY LINE	324667-01
U75	IC 74LS273	901521-42
U63, U65, U68	IC 74LS373	901521-29
U42, U66, U67, U72	IC 74LS245	901521-46
U64, U76	IC 74LS244	901521-13
U73	IC 74LS245	901521-46
U69	IC 74LS670	901521-22
U54	IC 74LS175	901521-34
U51, U77	IC 74LS74	901521-06

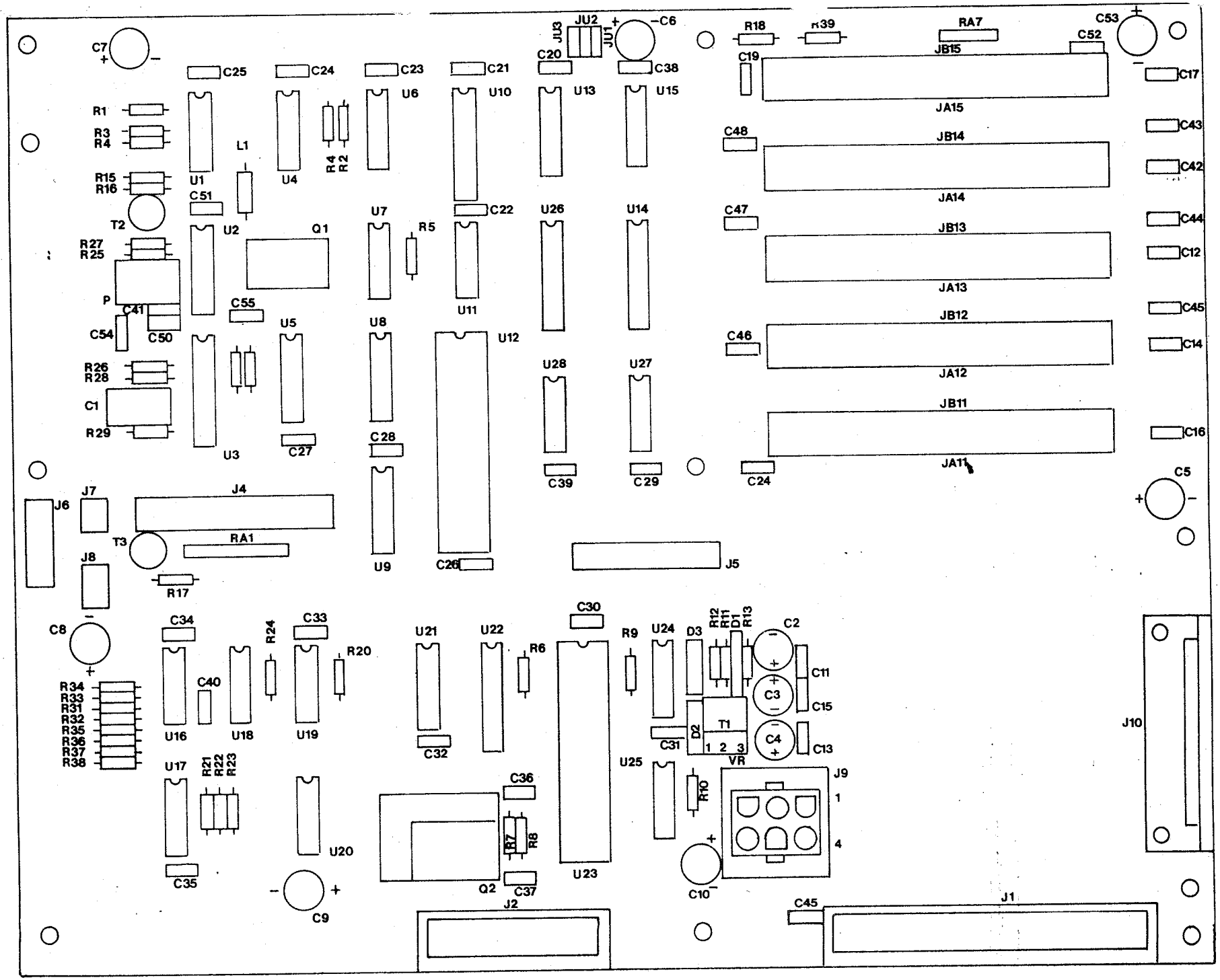
Schaltbildangabe / Circuit diagram information / Repère schéma / Designacion del diagrama de circuito	Benennung / Term / Désignation / Denominacion	Ersatzteilnummer / Spare Parts No. / No. de Pieces de rechange / No de requesto
C5-13, C23-42	CAP RADIAL CERAMIC 0.22µF/50V	900022-01
C14-22	CAP RADIAL CERAMIC 0.22µF/50V	900022-01
C43-71, C74, C75	CAP RADIAL CERAMIC 0.1 µF/50V	900020-01
C1-4, C72, C73	CAP ELECTR. RADIAL 47µF/16V	900100-27
J1	HEADER ASSY DUAL ROW 90° .100 CENTER	380302-02
J2	HEADER ASSY DUAL ROW 90° .100 CENTER	380302-01
JA4, JA6, JA8	WIRE JUMPER	903781-01
JA3, JA5, JA7	WIRE JUMPER	903781-01
JA1	WIRE JUMPER	903781-01
SW	DIP SWITCH (16 PIN)	904776-08
U59, U62	SOCKET IC 40 PIN	904150-06
U44, U46	SOCKET IC 28 PIN	904150-05
U43	SOCKET IC 20 PIN	904150-08
U19-36	SOCKET IC 16 PIN	904150-02


J2
J1
SW
RA4
C1
C46
U50
U51
U52
C52
C75
U76
C71
U77
R5
C45
U47
U48
U49
C51
U74
U75
C70
R23
R6
C44
U45
JA2
U46
C50
C69
U73
JA7
JA8
R21
U71
C68
C43
U43
JA5
JA4
JA6
U44
C49
R12
R13
C74
U72
R19
JA1
JA3
C48
U70
C72
C62
C42
C41
U41
U42
U40
R14A
R14B
R14C
R25
U38
R26
U68
U69
C61
U37
C47
U39
RA2
RA3
RA1
R18
R17
C60
U66
U67
C67
C13
U9
C22
U18
C31
U27
C40
U36
C59
R11
C58
U64
U65
C66
C12
U8
C21
U17
C30
U26
C39
U35
U63
C11
U7
C20
U16
C29
U25
C38
U34
R19
R24
C10
U6
C19
U5
C28
U24
C37
U33
U61
C57
U62
C65
C9
U5
C18
U14
C27
U23
C36
U32
C56
C73
R9
R10
U60
C8
U4
C17
U13
C26
U22
C35
U31
C64
U58
C55
U59
C7
U3
C16
U12
C25
U21
C34
U30
R7
R4
R1
C6
U2
C15
U11
C24
U20
C33
U29
U55
C54
U56
C63
R2
U57
TR
R22
R8
C5
U1
C14
U10
C23
U19
C32
U28
R3
U53
C53
U54
Q1
C4
C3
C2

PC 10/20 I/O PCB ASSY
(LAYOUT OF COMPONENTS)

Schaltbildangabe Circuit diagram information Repére schéma Designacion del diagrama de circuito	Benennung Term Désignation Denominacion	Ersatzteilnummer Spare Parts No. No. de Pieces de rechange No de requesto
U23	IC 8250 ACI 5 MHz	380205-01
U12	IC µPD 756 A FLOPPY CONTROLLER	380206-01
U3	IC WD 1691 DATA SEPARATOR	380207-01
U25	IC MC 1488 LINE DRIVER	901524-06
U24	IC MC 1489 LINE RECEIVER	901524-07
U2	IC 74LS629	901521-68
U5, U8, U13	IC 74LS175	901521-34
U1, U4, U28	IC 74LS74	901521-06
U21	IC 74LS174	901521-63
U14	IC 74LS374	901521-43
U6, U11, U15	IC 74LS125	901521-20
U22, U26	IC 74LS245	901521-46
U10	IC 74LS299	901521-72
U9	IC 74LS163	901521-33
U7	IC 74LS04	901521-02
U16	IC 74LS14	901521-30
U19	IC 74LS02	901521-21
U27	IC 74LS00	901521-01
U17, U18, U20	IC 7438	901521-09
VRI	7905 VOLTAGE REGULATOR	901527-03
Q2	CRYSTAL 1.8432 MHz	900555-02
Q1	CRYSTAL 8.0000 MHz	900556-01
T1, T2, T3	TRANSISTOR NPN BC 337-16	324220-01
D2, D3	DIODE, SILICON IN4001	900750-01

Schaltbildangabe Circuit diagram information Repére schéma Designacion del diagrama de circuito	Benennung Term Désignation Denominacion	Ersatzteilnummer Spare Parts No. No. de Pieces de rechange No de requesto
C11-19, C42-51	CAP RADIAL CERAMIC 0.22µF/50V	900022-01
C1	CAP RADIAL POLYESTER 0.68µF/63V	900150-13
C20-35, C38, C39, C52, C54, C55	CAP RADIAL CERAMIC 0.1 µF/50V	900020-01
C2-10, C53	CAP ELECTROLYTIC RADIAL 47µF/16V	900100-27
J10	CONNECTOR 25 PIN SUB-MINI-"D"	380307-02
J11-15	CARD-EDGE-CONNECTOR .100 CENTER	903446-02
J6	HEADER ASSY POLARIZED.100 CENTER	903326-07
J5	HEADER ASSY POLARIZED.100 CENTER	903331-13
J7	HEADER ASSY SINGLE ROW .100 CENTER	903326-02
J8	HEADER ASSY SINGLE ROW .100 CENTER	903326-03
J4	HEADER ASSY DUAL ROW, POLARIZED .100 CENTER	903345-17
J1	HEADER ASSY DUAL ROW, 90° .100 CENTER	380311-02
J2	HEADER ASSY DUAL ROW, 90° .100 CENTER	380311-01
J9	CONNECTOR 6 PIN FEMALE	903349-01
J16	HEADER ASSY DUAL ROW.100 CENTER	903345-03
	STANDOFF	380121-01
	LOCKWASHER, EXT. TOOTHED Ø 3.2	905652-04
	NUT, HEX 4-40 #	905970-05
	SCREW, PAN HEAD M3x6	906800-05
	NUT, HEX M3	905960-03

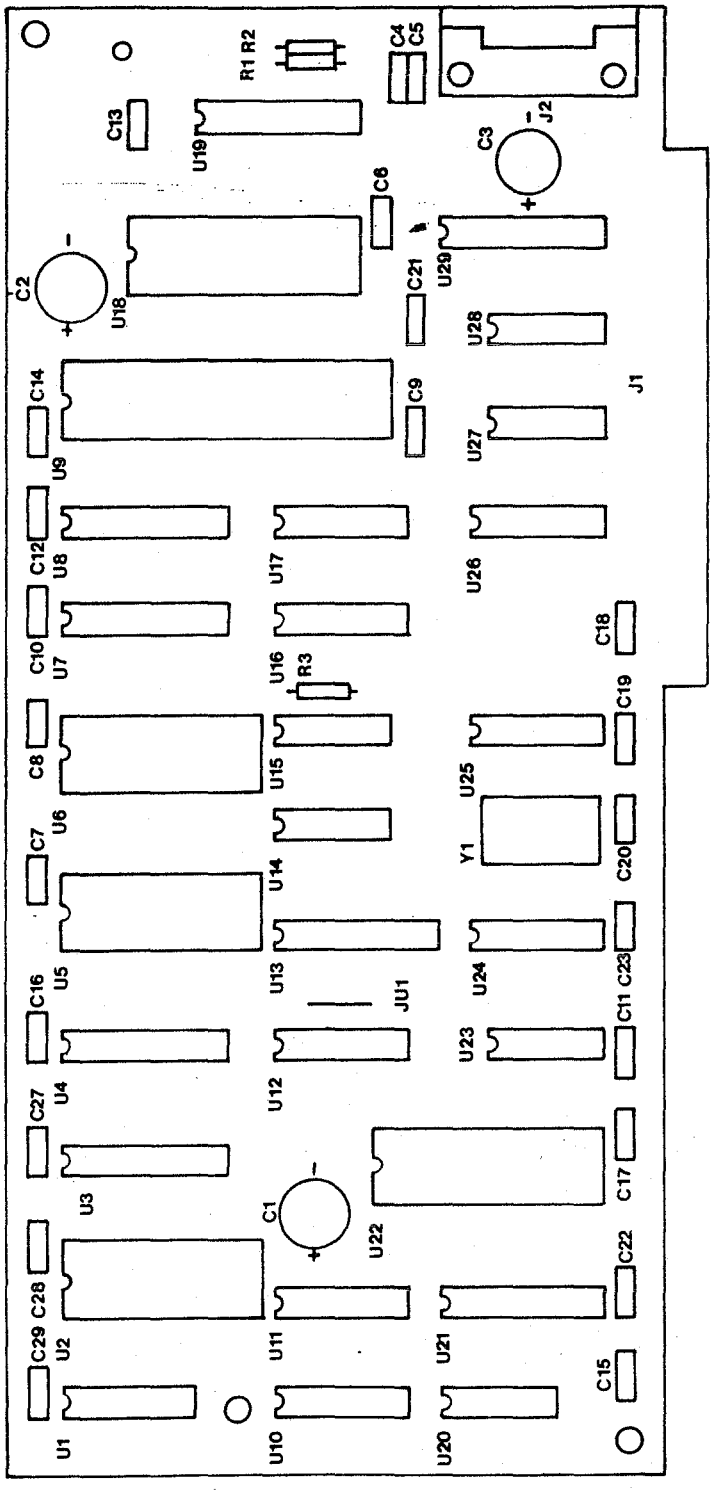

C7
C25
C24
C23
C21
JU3
JU2
JU1
C6
C20
C38
R18
R39
RA7
C53
C52
JB15
C19
JA15
C17
R1
R3
R4
U1
L1
U4
R4
R2
U6
U10
U13
U15
C43
C48
JB14
JA14
C42
R15
R16
T2
C51
U2
Q1
U7
R5
C22
U26
U14
C47
JB13
JA13
C44
C12
R27
R25
P
C41
C55
U11
C45
C54
C50
U5
U8
U12
JB12
C46
JA12
C14
R26
R28
C1
R29
U3
C27
C28
U28
U27
JB11
C16
C39
C29
C24
JA11
C5
J6
J7
J4
T3
RA1
J8
R17
U9
C26
J5
C8
C34
C33
C30
R9
U24
D3
R12
R11
D1
R13
C2
C11
C3
C15
C4
C13
R24
R20
U21
U22
R6
C40
T1
D2
1 2 3
VR
C31
U25
J9
1
4
J10
R34
R33
R31
R32
R35
R36
R37
R38
U16
U18
U19
C32
U17
R21
R22
R23
C36
R10
C10
U20
R7
R8
U23
Q2
C37
C35
C9
J2
C45
J1

65

PC 10/2[illegible] MONOCHROME VIDEO PCB ASSY
(LAYOUT OF COMPONENTS)

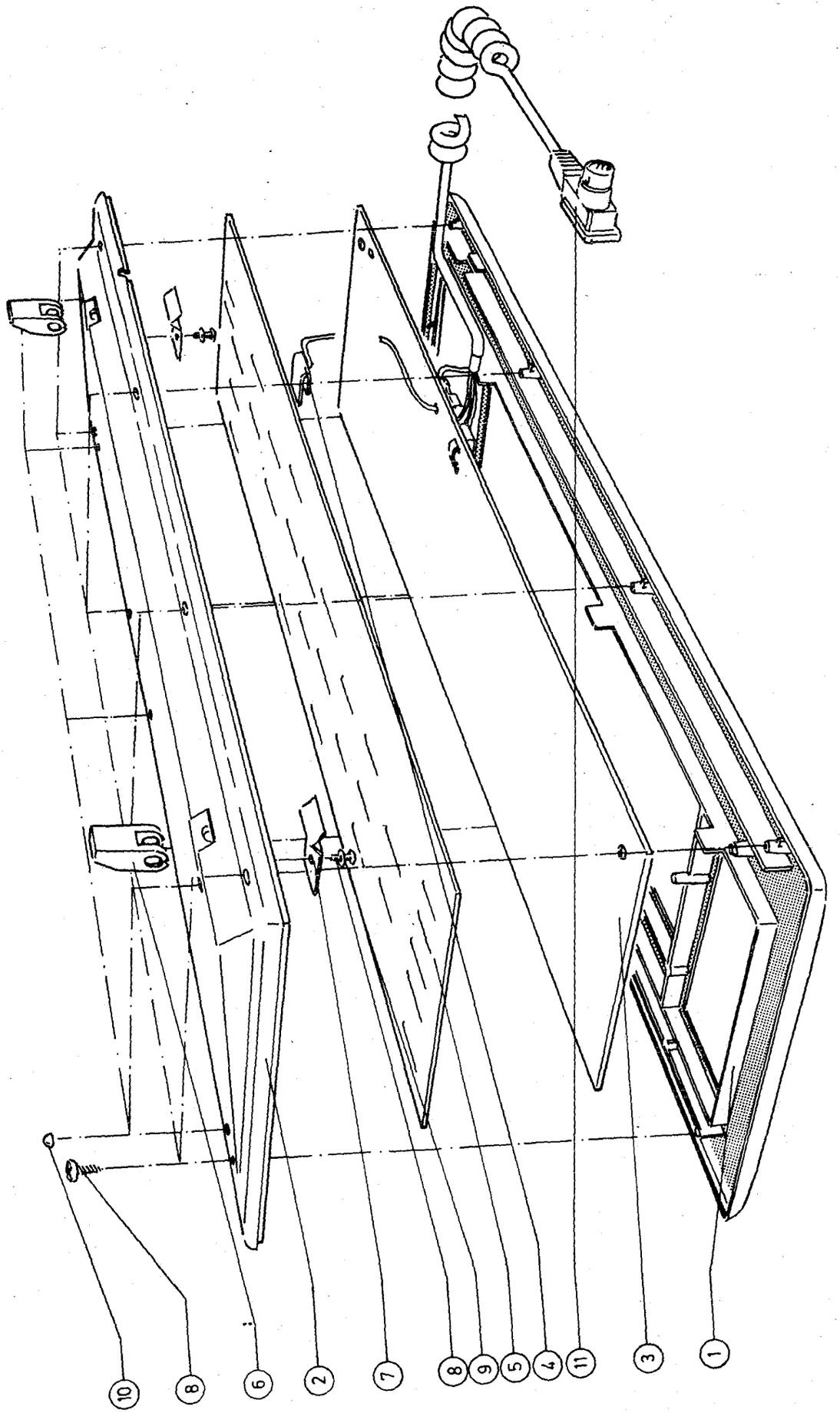
Schaltbildangabe Circuit diagram information Repère schéma Designacion del diagrama de circuito	Benennung Term Désignation Denominacion	Ersatzteilnummer Spare Parts No. No. de Pieces de rechange No de requesto
U9	IC 6545A-1 CRT-CONTROLLER	901479-02
U22	IC 7700 PLA IC N82S100 FPLA	380212-02
U18	IC 7700 PLA IC N82S100 FPLA	380212-03
U13	IC 16R6 PLA	380216-01
U5, U6	IC 2016 2 K x 8 BIT STAT.RAM	325502-03
U2	IC 2332 4K ROM IC 2532-35 4K EPROM	380217-01
U20	IC 74LS393	901521-45
U3, U7	IC 74LS374	901521-43
U16, U17, U26	IC 74LS257	901521-57
U29	IC 74LS245	901521-46
U8, U19	IC 74LS244	901521-13
U4	IC 74LS273	901521-42
U12	IC 74LS175	901521-34
U1	IC 74LS166	901521-71
U24	IC 74LS163 IC 74LS162	901521-33 901521-83
Y1	OSCILLATOR, 16.257 MHz	325566-12
U16, U17, U26	IC 74LS157	901521-11
U11	IC 74LS139	901521-18
U10	IC 74LS138	901521-16
U23	IC 74LS74	901521-06
U27	IC 74LS11	901521-80
U28	IC 74LS00	901521-01

Schaltbildangabe Circuit diagram information Repère schéma Designacion del diagrama de circuito	Benennung Term Désignation Denominacion	Ersatzteilnummer Spare Parts No. No. de Pieces de rechange No de requesto
U14	IC 74S04	901525-01
U15	IC 74S74	901525-09
U21	IC 74S374	901525-22
U25	IC 74S174	901525-30
R1, R2	RESISTOR CARBON 5% 0.25W 22K Ohm	901550-63
R3	RESISTOR CARBON 5% 0.25W 1K Ohm	901550-01
C1-10, C13-23	CAP RADIAL CERAMIC 0.1µF/50V	900020-01
C25, C26	CAP RADIAL CERAMIC 120pF/25V	900010-57
C11, C12, C24	CAP ELECTROLYTIC 47µF/16V	900100-27
U2	SOCKET IC 24-PIN	904150-04
	CONNECTOR 9 PIN, SUB-MINI-"D"	380307-01
	SCREW, PAN HEAD M3x4	906800-01
	SCREW, PAN HEAD M3x8	906800-03
	NUT, HEX M3	905960-03
	LOCKWASHER, EXT-TOOTHED Ø 3,2	905652-04
	STANDOFF	380121-01
	EXTENSION-CARD-PANEL	380120-02
	NUT, HEX 4-40 #	905970-05


R1 R2
C4 C5
C13
U19
J2
C3
C6
C2
U18
C21
U29
U28
C14
C9
J1
U9
U27
C12
U8
U17
U26
C10
U7
C18
U16
R3
C19
C8
U15
U25
U6
C7
Y1
C20
U14
C16
U5
U13
JU1
U24
C11 C23
U4
U12
U23
C27
C17
U3
C1
U22
C28
C22
C29
U2
U11
U21
C15
U1
U10
U20

PC 10/20 KEYBOARD ASSY

Position Position Position Posición	Benennung Term Désignation Denominación	Ersatzteilnummer Spare Parts No. No. de pieces de rechange No de requesto
1	Keyboard Housing, Top	380104-01
2	Keyboard Housing, Bottom	380105-01
3	Keyboard, PCB UK	380106-01
	Keyboard, PCB US	380106-02
	Keyboard, PCB German	380106-03
	Keyboard, PCB Italy	380106-04
	Keyboard, PCB France	380106-05
	Keyboard, PCB Spain	380106-06
	Keyboard, PCB Swiss	380106-07
	Keyboard, PCB Danmark	380106-08
	Keyboard, PCB Norway	380106-09
	Keyboard, PCB Finland/Sweden	380106-10
	Keyboard, PCB Icelandic	380106-11
4	Cable Assy for Keyboard	380452-01
5	Screen Shield	380451-01
6	2 x Foot, adjustable	380130-01
7	2 x Plate Spring	380131-01
8	10 x Screw, self tapping, 2,9 x 9,5 mm DIN 7981	906883-04
9	2 x Washer Flat Ø 4,3 DIN125	907272-06
10	5 x Foot plastic,self adhesive	380129-01
11	Keyboard Cable Assy II	380018-01


10
8
6
2
7
8
9
5
4
11
3
1

ALPS

DFC222A

MAINTENANCE MANUAL

ALPS ELECTRIC CO., LTD.

Contents

		Page
1.	Introduction	3
1-1	General	3
2.	Special Jigs, Tools and Measuring Instruments	3
2-1	List of Special Jigs and Tools	3
2-2	List of Measuring Instruments	3
2-3	CE Diskette	3
3.	Diagnosis Procedure	4
3-1	General	4
3-2	Soft Error Detection and Correction	4
3-3	Write Error	5
3-4	Read Error	5
3-5	Seek Error	5
3-6	Compatibility Error	6
3-7	List of Test Points	6,7
4.	Parts Exchange	8
4-1	Printed Circuit Board Exchange	8,9
4-2	Lever Exchange	10,11
4-3	Front Plate Exchange	12,13
4-4	Lever Frame Assy Exchange	14,15
4-5	Stepping Motor Assy Exchange	16,17
4-6	Head Assy Exchange	18,19
4-7	Spindle Motor Assy Exchange	20,21
4-8	∅ Track Sensor Assy Exchange	22,23
4-9	Metal Belt Exchange	24,25

Page

5. Adjustments and Checks 26

5-1 Spindle Speed Adjustment 26
5-2 Radial Track Adjustment 27,28
5-3 0 Track Sensor Adjustment 29
5-4 Azimuth Check 30
5-5 Index Burst Time Adjustment 31,32
5-6 Level Check 33
5-7 Resolution Check 34
5-8 Symmetry Adjustment 35,36
5-9 Write Protect Sensor Check 37
5-10 Head Cleaning 37

6. Troubleshooting Hints 38,39
40,41

Diagrams

1. PCB Part Layout Diagram 42
2. Circuit Diagram 43
3. Overall Assembly Diagram 44

1. Introduction

This maintenance manual is for the maintenance of DFC222A.

1-1 General

The floppy disk drive is a high precision equipment and requires the following jigs, tools, measuring instruments, and adjustments when repairing or changing parts.

2. Special Jigs, Tools and Measuring Instruments

2-1 List of Special Jigs and Tools

CE diskette
Blank diskette
Test pin connector
Alignment adjusting jig
0 track adjusting jig

2-2 List of Measuring Instruments

Oscilloscope
Brikon
Frequency counter

2-3 CE Diskette (Alignment Diskette)

This diskette is used for the following adjustments and inspection.

(1) R/W head radial position
(2) R/W head azimuth
(3) Index position

3. Diagnosis Procedure

3-1 General

Errors caused by an incorrect operating procedure, erroneous programming, damaged diskette, and soft errors caused by dirty air, random electric noise, and other external factors are often considered to be drive failures or incorrect adjustments. Check that errors are repetitively produced with the first diskette and that similar errors are also produced with other diskettes, unless obvious assembly trouble and damage are found in visual inspection.

3-2 Soft Error Detection and Correction

Soft errors are generally caused by the following.

(1) Dirty air between the R/W head and disk. Normally, this dirt is cleaned by the liner in the diskette.

(2) Random electrical noise less than serveral microseconds.

(3) Delicate track misalignment and writing timing misalignment that are not detected during writing may cause soft errors during reading.

(4) Improper ground of the drive or host system power supply.

(5) Improper motor speed.

The following actions are required on the control side to recover the foregoing soft errors.

1) Reread the track ten times or until data recovers.

2) Access the head to an adjacent track in the same direction as the track if the error is not recovered by Step 1). Then return the head to the previous track.

3) Repeat Step 1).

4) Errors that cannot be recovered after taking these steps cannot be recovered.

3-3 Write Error

Operate READ-AFTER-WRITE if an error occurs during the write operation.

If the error cannot be recovered after operating READ-AFTER-WRITE more than four times, operate READ-AFTER-WRITE on another track to determine whether the diskette or drive is responsible for the error. Change the diskette and repeat these steps if the same error remains. If the error still remains, the drive has some fault and if the error is erased, the diskette is defective and should be discarded.

3-4 Read Error

Most errors are soft errors. Data can be recovered by following the error recovery steps (3-2).

3-5 Seek Error

(1) Trouble winh the stepping motor or stepping motor drive circuit

(2) Carriage trouble

Seek error is recovered by system soft. There are two recovering ways.

1) Recalibrate

2) Detect ID field

3-6 Compatibility Error

In some cases, data written by one drive cannot be read by another drive. This is due mainly to the following reasons:

The check points are listed below.

(1) Improper head alignment 5-2
(2) The head output is low 5-6
(3) Motor speed irregularity 5-1
(4) Check if the recommended sector format is set up.

3-7 List of Test Points (See Figure 3-7)

Test Point	Signal Name
TP1	AMP OUT +
TP2	AMP OUT −
TP3	GND
TP4	STEP
TP5	READ DATA
TP6	INDEX
TP7	WRITE PROTECT
TP8	TRACK 0
TP9	GND

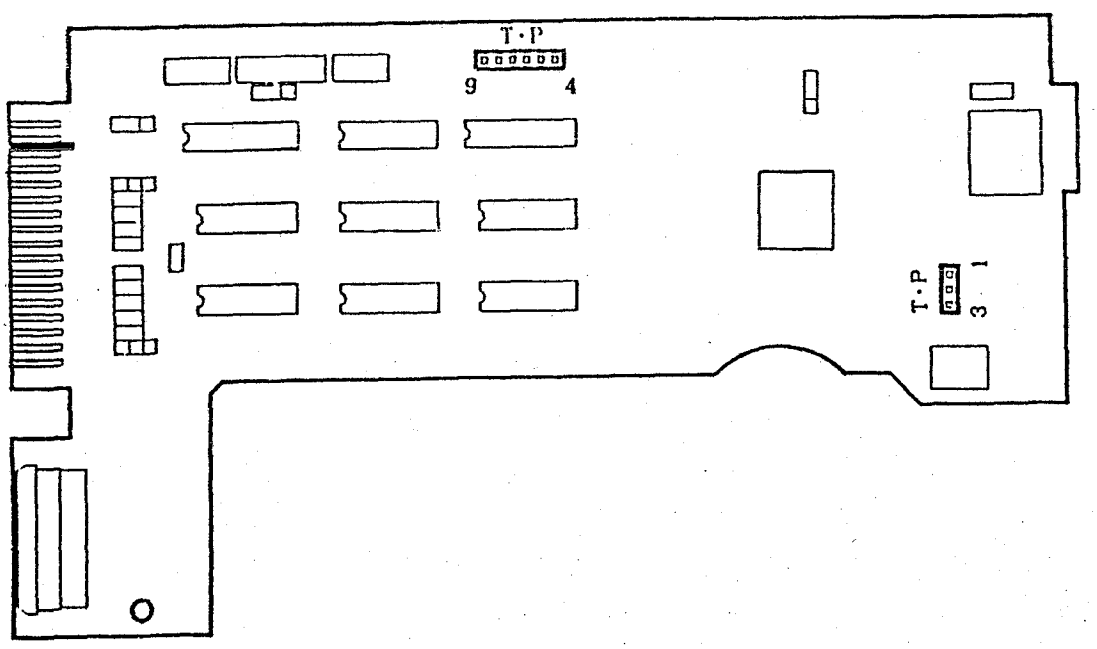


Fig. 3-7 Test Point Layout

4. Parts Exchange

4-1 Printed Circuit Board Exchange (See Figure 4-1)

4-1-1 Printed Circuit Board Removal

a) Expand the two shield board pins.
b) Unfasten the three fix screws and remove the shield board.
c) Disconnect the connectors (head, stepping motor, spindle motor, 0 track sensor, index sensor, and write protect sensor).
d) Unfasten the four printed circuit board fix screws.
e) Lift the rear edge of the printed circuit board and pull it back.

4-1-2 Printed Circuit Board Mounting and Adjustment

a) Tilt the printed circuit board as if to lower the front edge, insert the front LED into the LED insertion hole on the front plate, then lower the rear edge.
b) Fix the printed circuit board with four screws.
c) Secure the shield board with three fix screws.
d) Reconnect the disconnected connectors (head, stepping motor, spindle motor, 0 track sensor, index sensor, and write protect sensor).
e) Bend the two shield board pins and fix the head cable.

Note: Insert the head cord under the shield board.

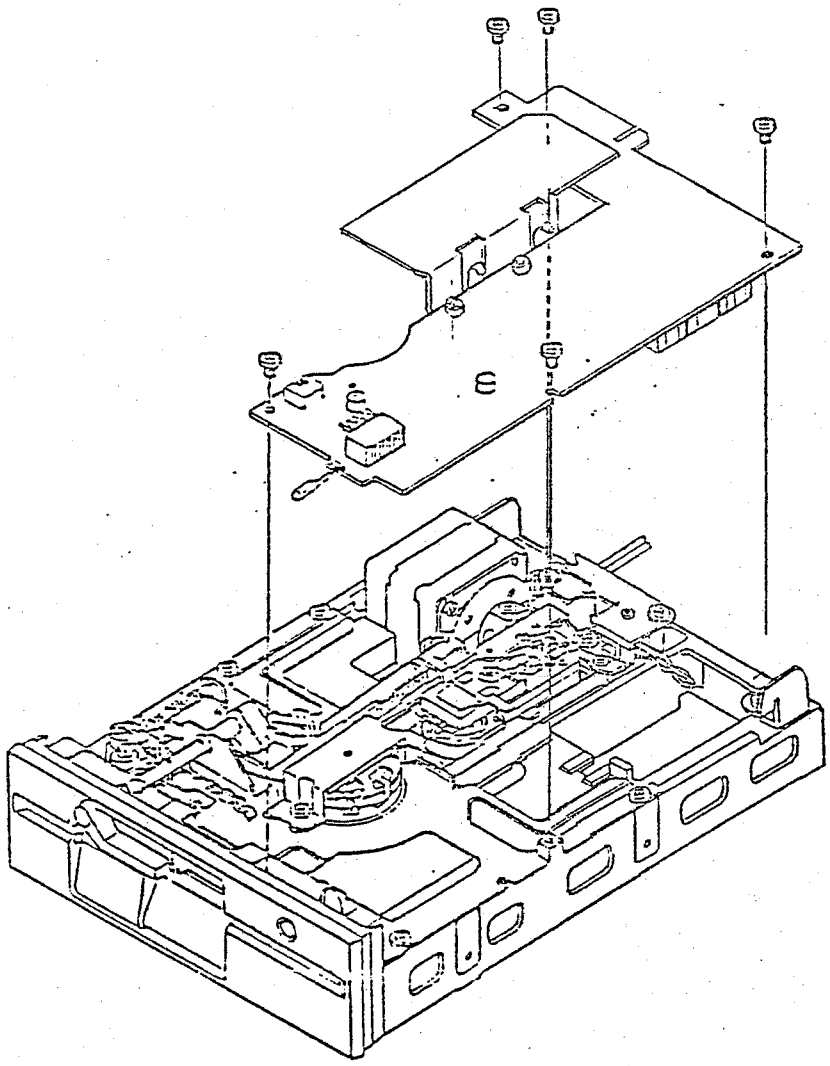


Fig.4-1 Printed Circuit Board Removal

4-2 Lever Exchange (See Figure 4-2)

4-2-1 Lever Removal

a) Set the lever horizontally.
b) Unfasten the fix screw of the lever.
c) Pull the lever forward.

4-2-2 Lever Mounting

a) Place the wide part of the lever cam on the hub side and check that the lever shaft hole can be seen from above. (Hub open state)
b) Set the lever horizontally and insert from the front.
c) Secure the lever with a screw.

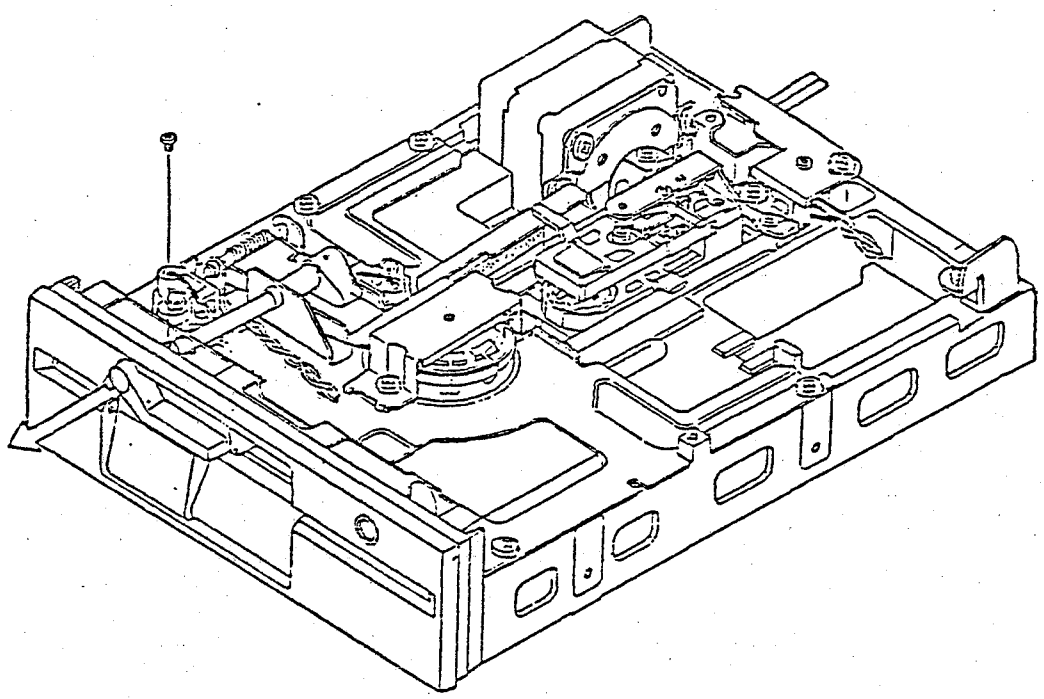


Fig.4-2 Lever Exchange

4-3 Front Plate Exchange(See Figure 4-3)

4-3-1 Front Plate Removal

a) Remove the lever as described in 4-2-1.
b) Unfasten the two front plate fix screws.
c) Pull the front plate forward.

4-3-2 Front Plate Mounting

a) Insert the front plate from the front.
b) Secure the front plate with two screws.
c) Mount the lever as described in 4-2-2.

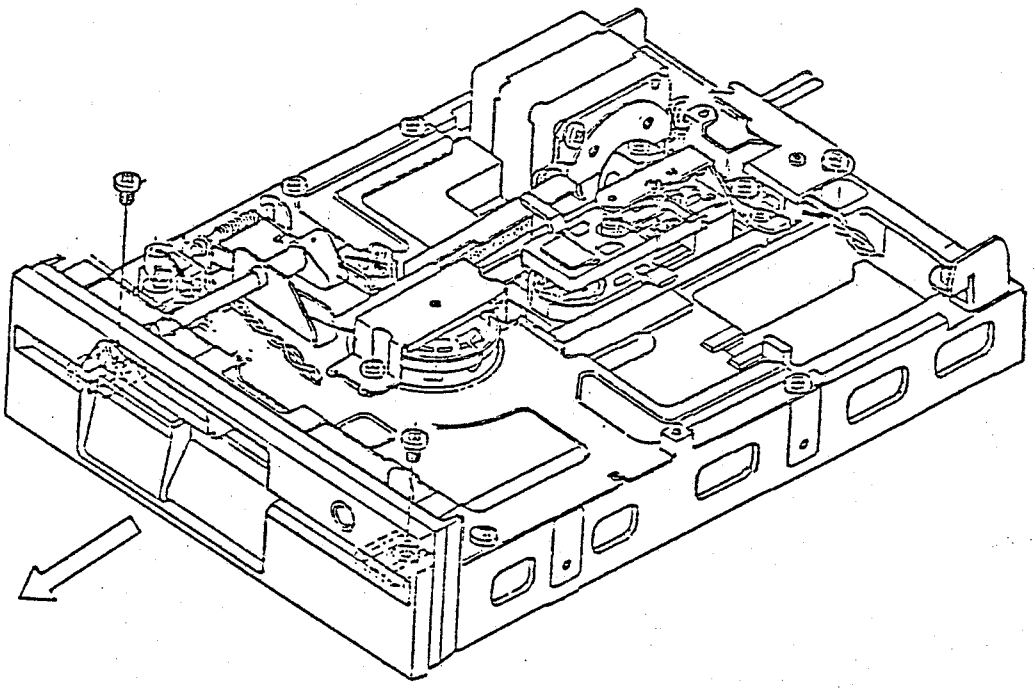


Fig.4-3 Front Plate Exchange

4-4 Lever Frame Assy Exchange (See Figure 4-4)

4-4-1 Lever Frame Assy Removal

a) Remove the printed circuit board as described in 4-1-1.
b) Remove the lever as described in 4-2-1.
c) Remove the front plate as described in 4-3-1.
d) Insert protection paper (high quality white paper approximately 10 x 30 mm) between two heads to protect them.
e) Unfasten the five lever frame assy fix screws.
f) Lift the lever frame assy slightly, making sure that the top head is not raised, and remove the sliding to the left.

4-4-2 Lever Frame Assy Mounting and Adjustment

a) Lift the top head slightly and slide the pad mounting part of the lever frame assy under the top head.
b) Secure the lever frame assy with five screws.
c) Remove the protection paper.
d) Mount the front plate as described in 4-3-2.
e) Mount the lever as described in 4-2-2.
f) Mount the printed circuit board as described in 4-1-2.
g) After mounting, adjust the index burst time. (Refer to 5-5.)

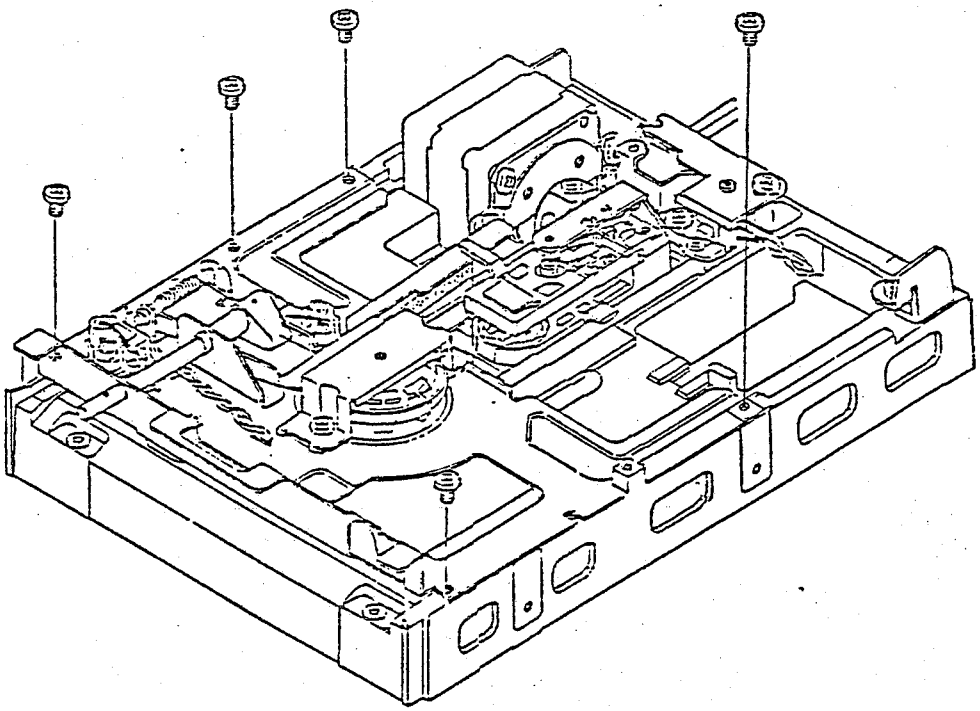


Fig.4-4 Lever Frame Assy Exchange

4-5 Stepping Motor Assy Exchange (See Figure 4-5)

4-5-1 Stepping Motor Assy Removal

a) Remove the printed circuit board as described in 4-1-1.
b) Unfasten the head assy metal belt fix screw.
c) Unfasten the stepping motor metal belt fix screw and remove the keep plate.
d) Unfasten the two stepping motor assy fix screws.
e) Lift the stepping motor assy upward, then slide it to the left to remove from the metal belt.
f) Disconnect the stepping motor assy cord from the hook.

4-5-2 Stepping Motor Assy Mounting Adjustment

a) Keep the metal belt in the loop form, insert the stepping motor assy, mount the metal belt and keep plate with screw.
b) Align the oval hole of the stepping motor mounting plate with the guide pin and mount the stepping motor assy with two screws. Temporary tightening of screws are required.
c) Pull the tip of the metal belt and mount the metal belt on the tip of the head assy with a screw.
d) Move the head assy back and forth and check that the metal belt is not twisted. If twisted, slightly loosen the metal belt fix screws on the stepping motor assy and head assy, and move the head assy back and forth several times. Fasten tightly the screws.
e) Place the stepping motor assy cord on the hook.
f) Mount the printed circuit board as described in 4-1-2.
g) Adjust the radial track after mounting. (Refer to 5-2.)

Caution: Do not reuse the metal belt removed from the head assy.

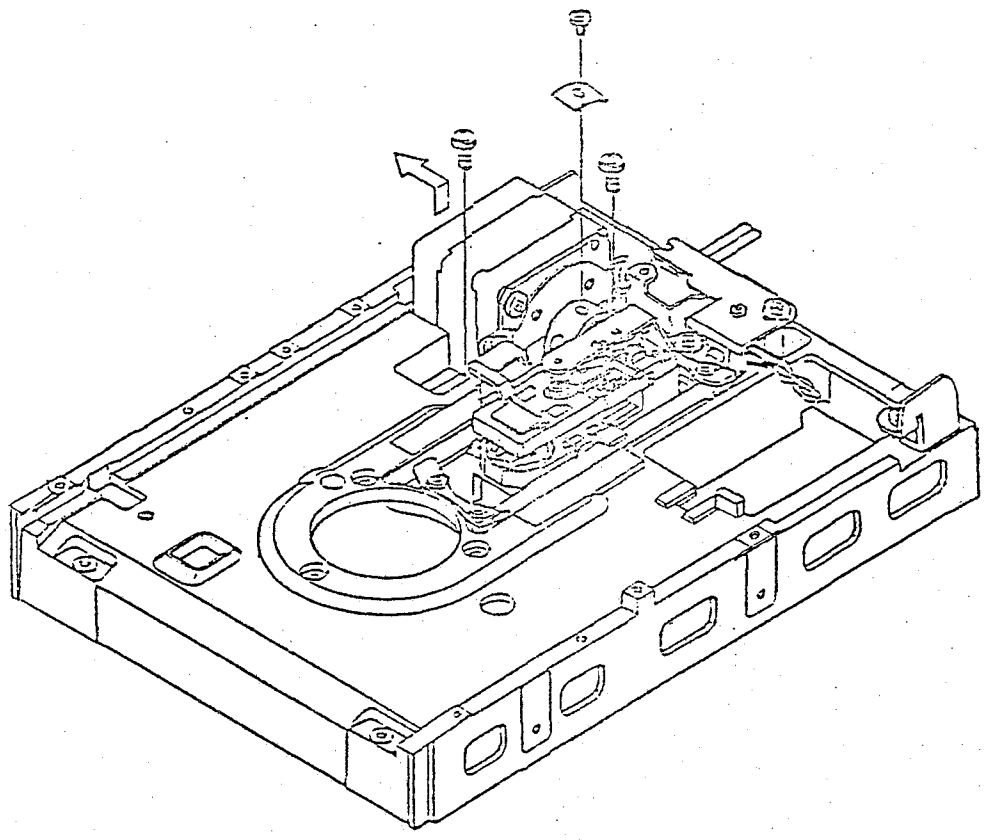


Fig.4-5 Stepping Motor Assy Exchange

4-6 Head Assy Exchange (See Figure 4-6)

4-6-1 Head Assy Removal

a) Remove the printed circuit board as described in 4-1-1.
b) Remove the lever as described in 4-2-1.
c) Remove the front plate as described in 4-3-1.
d) Remove the lever frame assy as described in 4-4-1.
e) Remove the stepping motor assy as described in 4-5-1
f) Unfasten the PCB post fix screws snd remove the PCB post.
g) Unfasten the two screws fastening the guide shaft keepers A and B and remove keepers A and B.
h) Lift the guide shaft rear edge and remove the guide shafts in a backward direction, individually. Be careful not to damage the guide shafts or mix the right and left shafts.
i) Carefully remove the head assy.

4-6-2 Head Assy Mounting and Adjustment

a) Fit the two guide shafts in the head assy without mixing the right and left, and mount in the housing while holding the guide shafts.
b) Secure guide shaft keepers A and B using four screws.
c) Secure the PCB post using screws.
d) Mount the stepping motor assy as described in 4-5-2.
e) Mount the lever frame assy as described in 4-4-2.
f) Mount the front plate as described in 4-3-2.
g) Mount the lever as described in 4-2-2.
h) Place the printed circuit board as described in 4-1-2.
i) Adjust the radial track (5-2) and index burst time (5-6), and check the ∅ track sensor (5-3), azimuth (5-4), level (5-6), and resolution (5-7) after mounting.

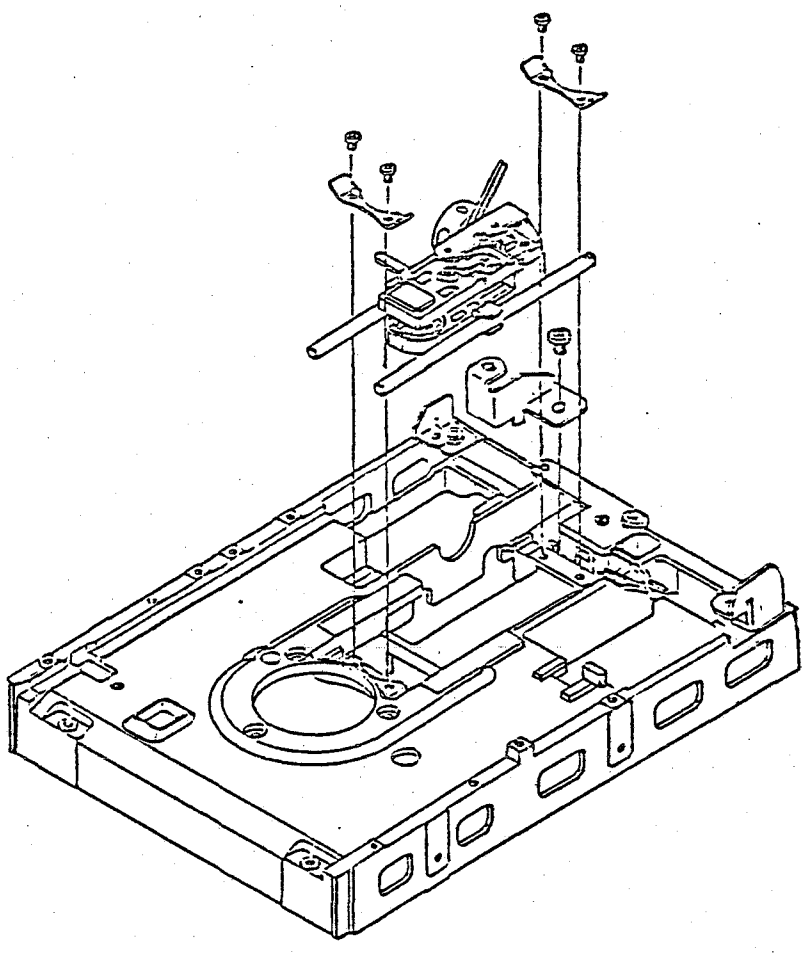


Fig.4-6 Head Assy Exchange

4-7 Spindle Motor Assy Exchange (See Figure 4-7)

4-7-1 Spindle Motor Assy Removal

a) Remove the printed circuit board as described in 4-1-1.
b) Remove the lever as described in 4-2-1.
c) Remove the front plate as described in 4-3-1.
d) Remove the lever frame assy as described in 4-4-1.
e) Unfasten the seven spindle motor fixing screws (three screws on the top and four screws on the bottom).
f) Remove out the spindle motor in a downward direction. Be careful not to damage the top surfaces of the spindle.

4-7-2 Spindle Motor Assy Mounting Adjustment

a) Secure the spindle motor with seven screws. Align the W/P LED at approximately the center of the housing hole.
b) Mount the lever frame assy as described in 4-4-2.
c) Mount the front plate as described in 4-3-2.
d) Mount the lever as described in 4-2-2.
e) Place the printed circuit board as described in 4-1-2.
f) Adjust the index burst time after mounting. (Refer to 5-5.)

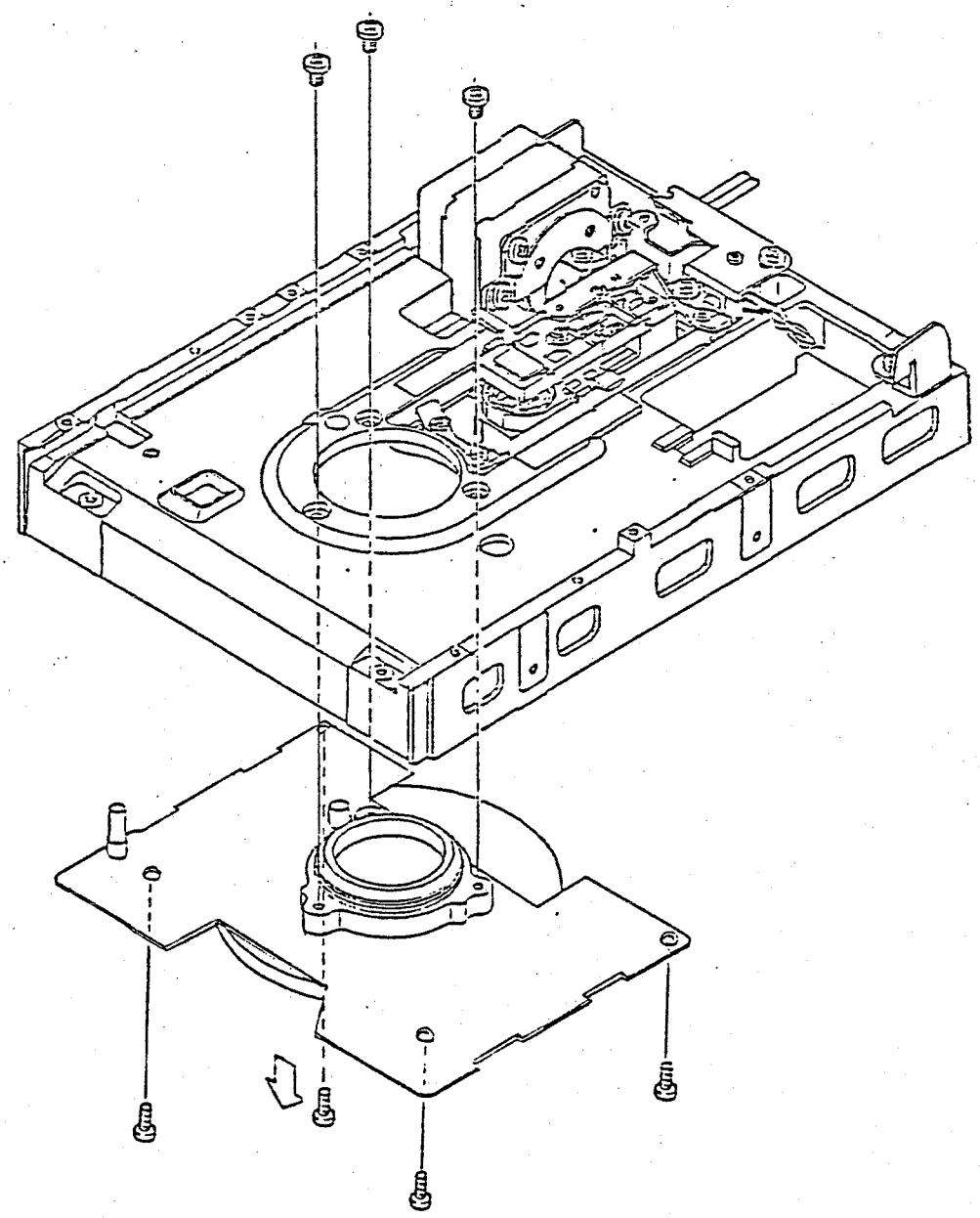


Fig.4-7 Spindle Motor Assy Exchange

4-8 0 Track Sensor AssyExchange(See Figure 4-8)

4-8-1 0 Track Sensor Assy Removal

a) Remove the printed circuit board as described in 4-1-1.
b) Unfasten the 0 track sensor assy fix screw.
c) Remove the 0 track sensor assy.

4-8-2 0 Track Sensor Assy Mounting and Adjustment

a) Mount the 0 track sensor assy with screw.
Temporary tightening of screws are required.
b) Place the printed circuit board as described in 4-1-2.
c) Adjust the 0 track sensor after mounting. (Refer to 5-3.)

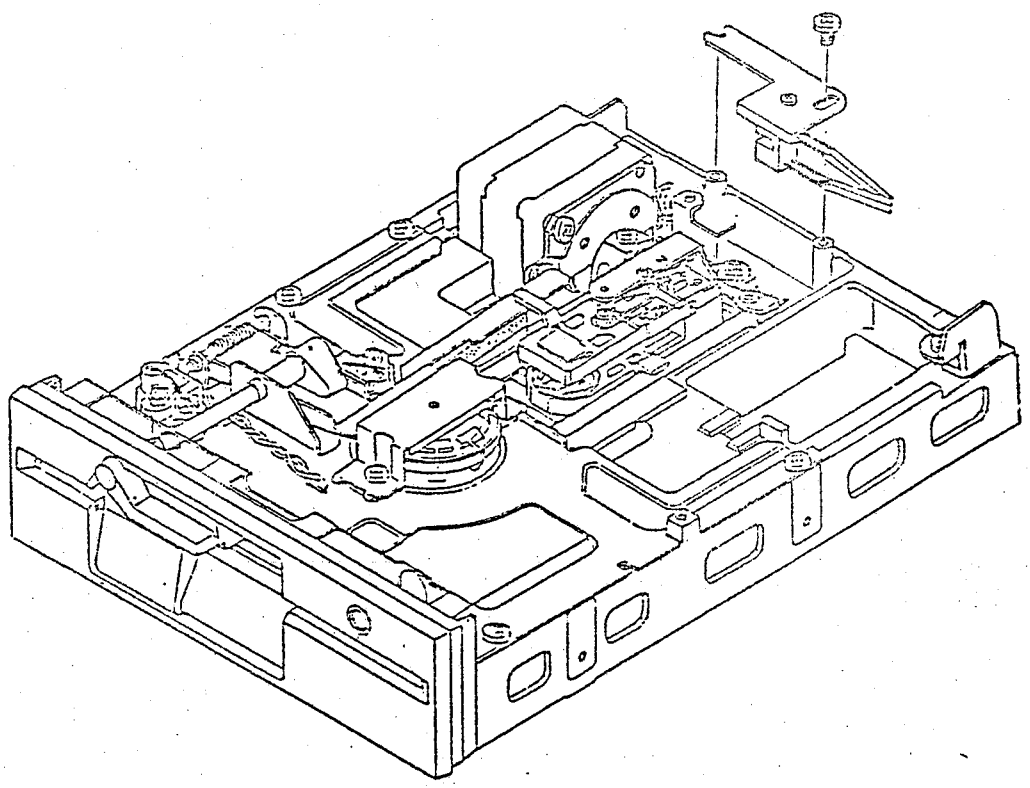


Fig.4-8 ∅ Track Assy Exchange

4-9 Metal BeltExchange(See Figure 4-9)

4-9-1 Metal Removal

a) Remove the printed circuit board as described in 4-1-1.
b) Remove the lever as described in 4-2-1.
c) Remove the front plate as described in 4-3-1.
d) Remove the lever frame assy as described in 4-4-1.
e) Remove the stepping motor assy as described in 4-5-1.
f) Remove the head assy as described in 4-6-1.
g) Unfasten the metal belt fix screw and remove the metal belt from the head assy.

4-9-2 Metal Belt Mounting and Adjustment

a) Mount the metal belt on the head assy using screws. (Be careful of the metal belt direction.)
b) Mount the head assy as described in 4-6-2.
c) Mount the stepping motor assy as described in 4-5-2.
d) Mount the lever frame assy as described in 4-4-2.
e) Mount the front plate as described in 4-3-2.
f) Mount the lever as described in 4-2-2.
g) Mount the printed circuit board as described in 4-1-2.
h) Adjust the radial track (refer to 5-2), index burst time (5-5), and 0 track sensor (5-3) after mounting.

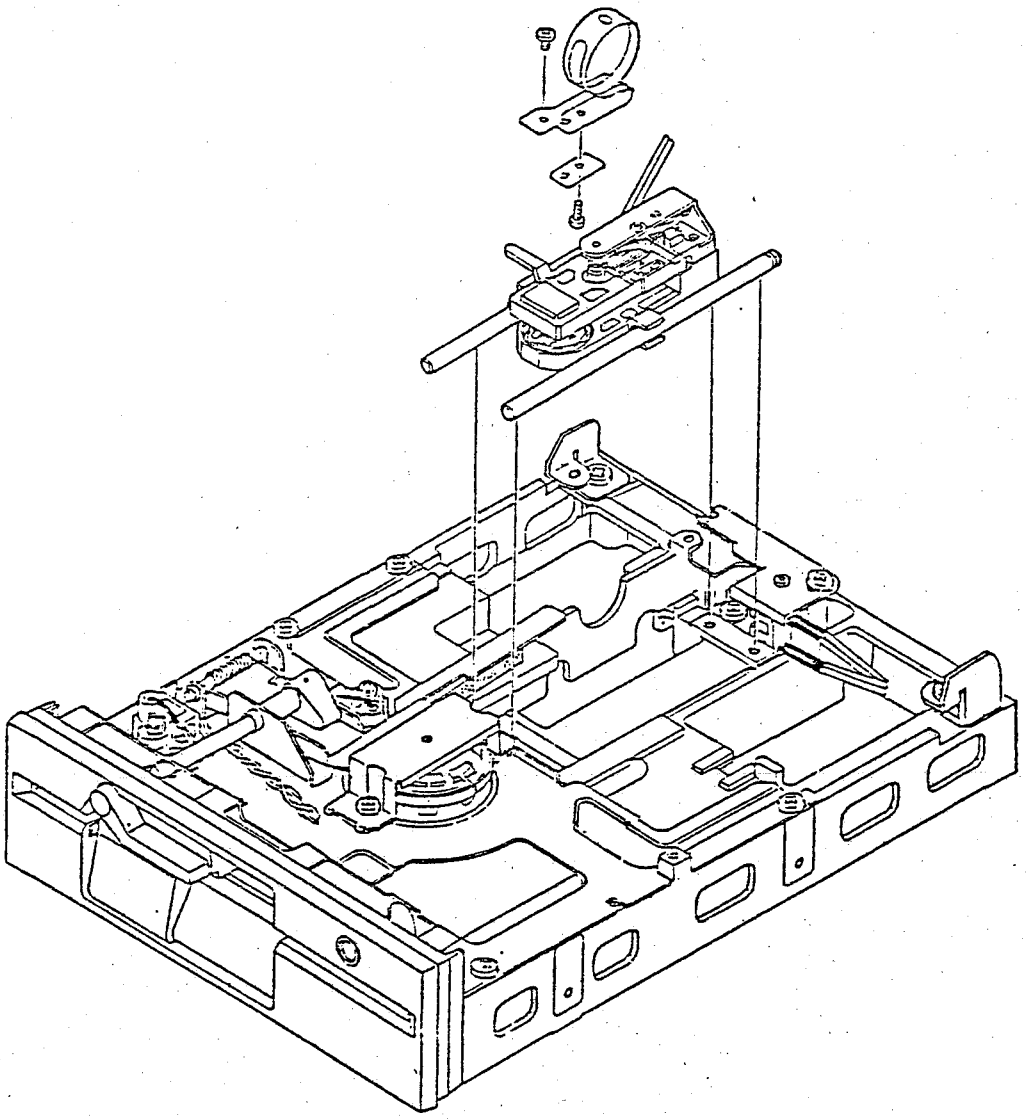


Fig.4-9 Metal Belt Exchange

5. Adjustments and Checks

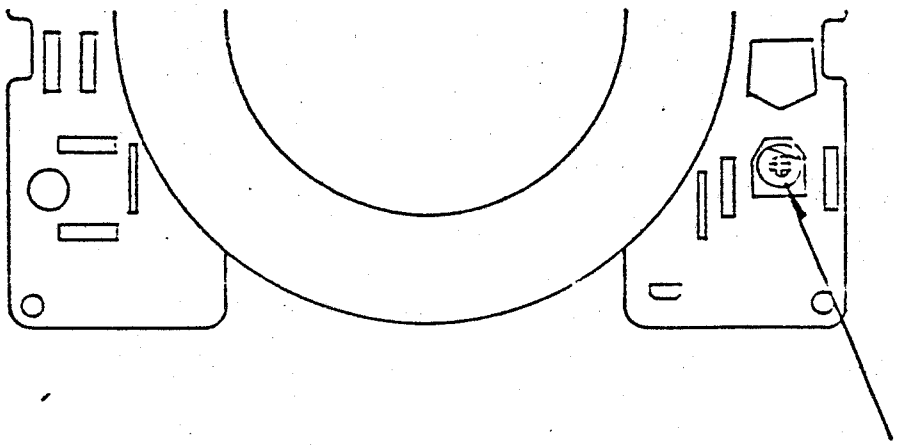
5-1 Spindle Speed Adjustment

a) Insert and clamp a blank diskette by rotating the motor.

b) Stop on 0 Track.

c) Connect the frequency counter to TP6.

d) Rotate the speed adjusting variable resister on the spindle-motor printed circuit board and adjust so that the counter shows 200 ±2 ms.



5-2 Radial Track Adjustment

a) Insert a CE diskette.

b) Move the head to Track 16 and check the cat's-eye waveforms of the top and bottom heads.

c) Adjust as follows if one of the top or bottom heads is not more than 75% in an amplitude ratio of two waveforms.

d) Slightly loosen the fix screws of the stepping motor assy and move the stepping motor assy back and forth to adjust the amplitudes. The amplitudes of two waveforms should be nearly the same. Then tighten the rear screw.

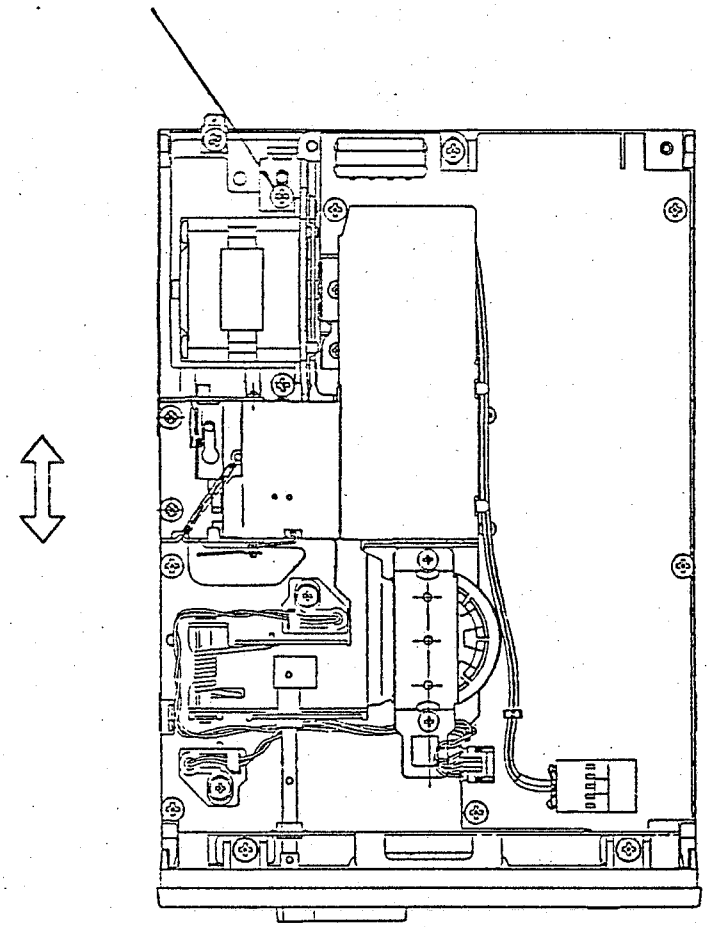
e) Check the cat's-eye waveforms of the top and bottom heads.

f) Repeat from d) if adjustment fails.

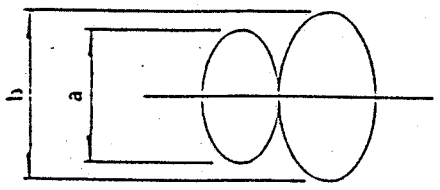
Measuring Conditions

Channel 1-TP1 (10mV/div) MODE--ADD

Channel 2-TP2 (10mV/div) Sweep-20ms/div



Head Reading Output Signal (TP1-TP2)



$$\frac{a}{b} \times 100 \geqq 75\%$$

Fig. 5-2

5-3 0 Track Sensor Adjustment

a) Insert a CE diskette.

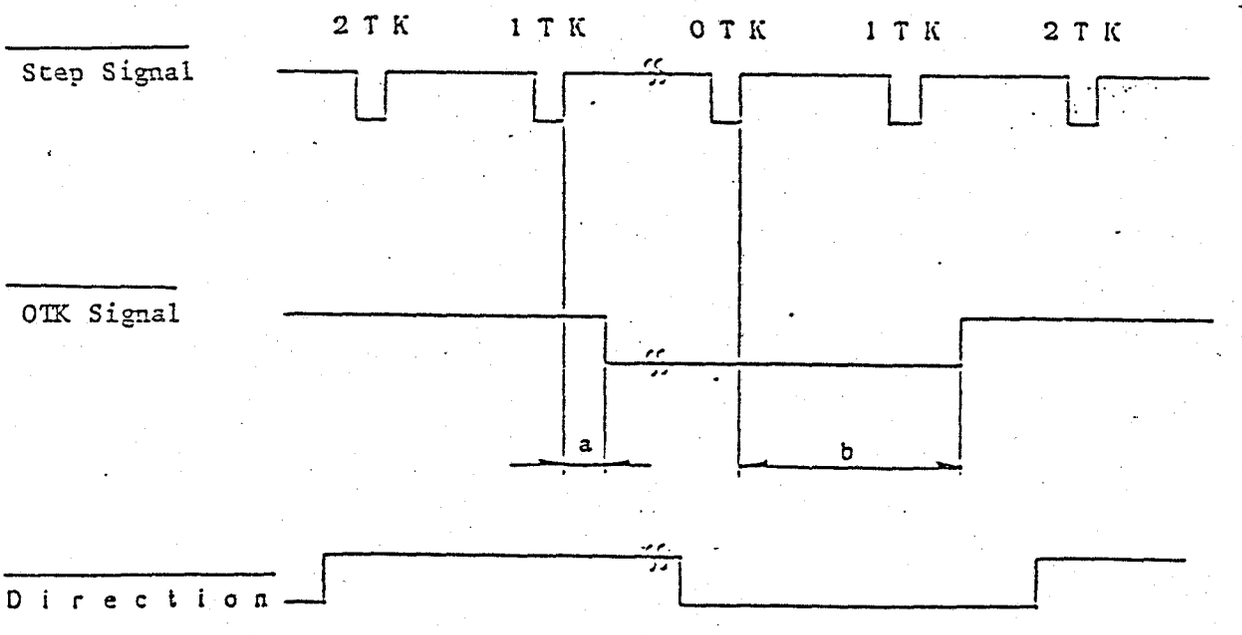
b) Continuously seek between 0 and 2 Tracks at 6 ms.

c) Adjust the 0 track sensor assy so that the step signal and 0 Track one. are always on the timing as shown in Figure 5-3. Then secure with a acrew.

Measuring Conditions

Channel 1-TP4 (0.2V/div) MODE--DUAL

Channel 2-TP8 (0.2V/div) Sweep-10ms/div



a = 3 m s max

b = 8 m s min

Fig. 5-3

PAGE	SYMB.	DATE	APPD.	CHKD.	DSGD.	APPD.	CHKD.	DSGD.	TITLE
								May 17 '85 H Nakaya	DOCUMENT NO. 29/44

5-4 Azimuth Check

a) Insert a CE diskette.

b) Move the head to Track 34 and check that the azimuth waveforms of the top and bottom heads are as described in Figure 5-4.

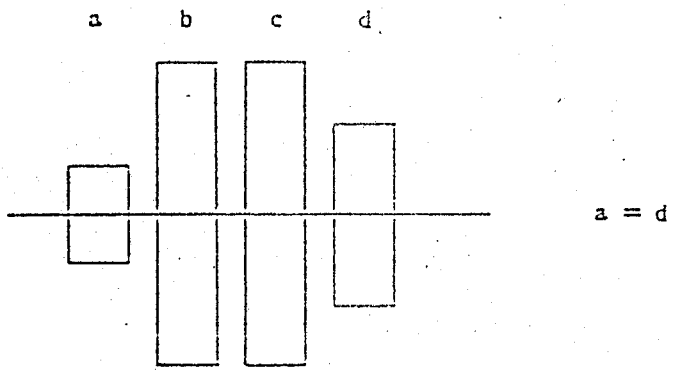
c) Exchange the head assy if the azimuth of one of the top and bottom heads is not as shown in Figure 5-4.

Measuring Conditions

Channel 1-TP1 (10mV/div) MODE--ADD

Channel 2-TP2 (10mV/div) Sweep-1ms/div

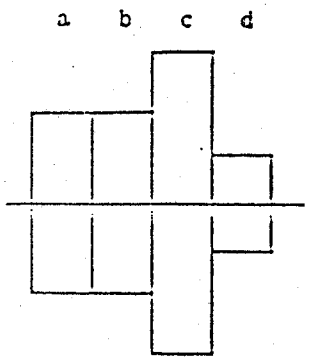
Trigger---TP6



Shows 0 minute

1) When a>d (negative)

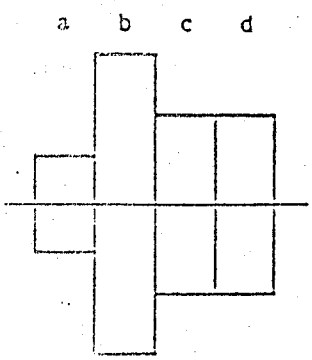
Must be a≦b.



Shows misalignment by -18'.

2) When a<d (positive)

Must be c≧d.



Shows misalignment by +18'.

Head azimuth = 0°±18'.

Fig. 5-4

ALPS ELECTRIC CO., LTD.

5-5 Index Burst Time Adjustment

a) Insert a CE diskette.

b) Move the head to Track 34 and check the index burst times of the top and bottom heads. Adjust as follows if the timing of one of the top or bottom heads is not as shown in Figure 5-3.

c) Move the index sensor assy back and forth by slightly loosening the index sensor assy fix screws to adjust the index burst time.

d) Check the index burst times of the top and bottom heads.

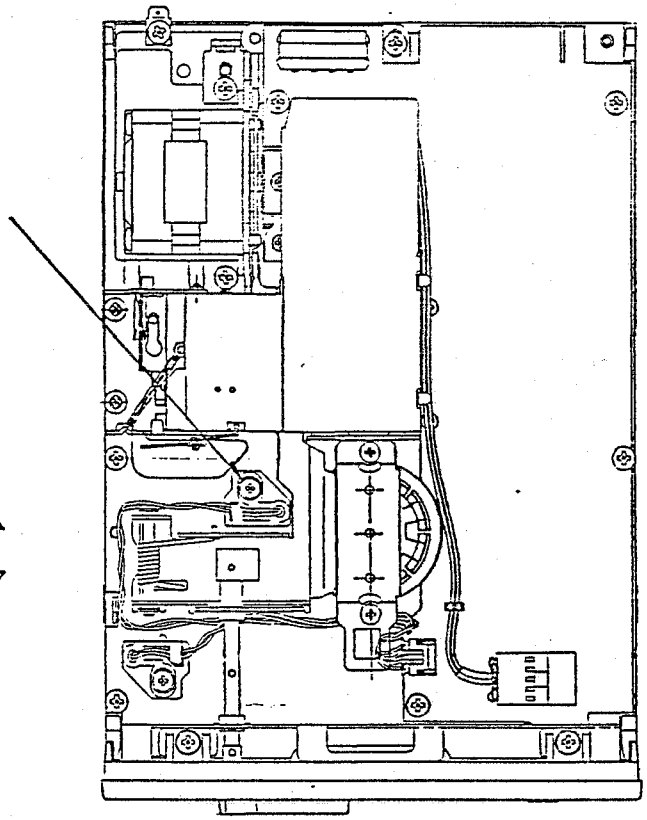
e) Repeat from c) if adjustment has been unsuccessful.

Measuring Conditions

Channel 1-TP1 (10mV/div) MODE--ADD

Channel 2-TP2 (10mV/div) Sweep-0.1ms/div

Trigger---TP6



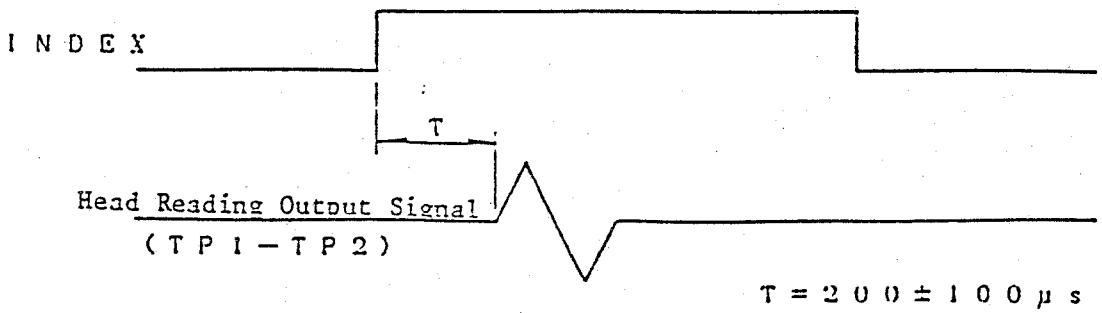


Fig. 5-5

5-6 Level Check

a) Insert a blank diskette.

b) Move the head to Track 39 and write 2F by the top and bottom heads.

c) Check that the average output level of the top and bottom heads is more than 350 mV. Perform the following if the output level is below the required standard.

d) Insert another blank diskette and reconfirm.

e) Check the spindle speed as described in 5-1.

f) Change the oscilloscope to the CHOP mode and check the TP1 and TP2 outputs. Exchange the printed circuit board if one output is small or missing, even if the probes are normal.

g) Exchange the head assy if no problems are encountered in d), e), and f) above.

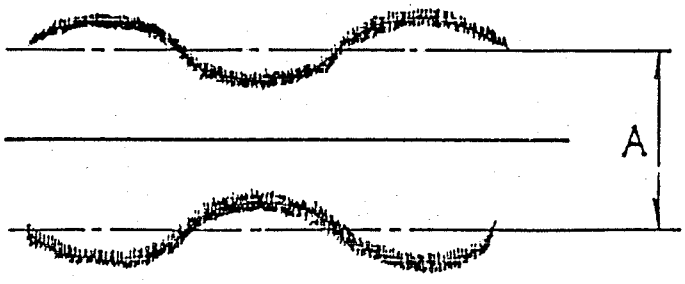
Measuring Conditions

Channel 1-TP1 (10mV/div) MODE--ADD

Channel 2-TP2 (10mV/div) Sweep-20ms/div

Trigger---TP6

Head Reading Out Signal (TP1-TP2)



A = 350mV min

Fig. 5-6

5-7 Resolution Check

a) Insert a blank diskette.

b) Move the head to Track 39, write 1F and 2F by the top and bottom heads, then measure the average output level.

c) The resolution is higher than 65%, and calculations shall be made as follows:

2F output (mV)/1F output (mV) *100≧65%

Measuring Conditions

Channel 1-TP1 (10mV/div) MODE--ADD
Channel 2-TP2 (10mV/div) Sweep-20ms/div
Trigger---TP6

$$\text{Resolution} = \frac{\text{2F average output level}}{\text{1F average output level}}$$

95% or less with TK0
65% or more with TK39

5-8 Symmetry Adjustment

a) Insert a blank diskette.

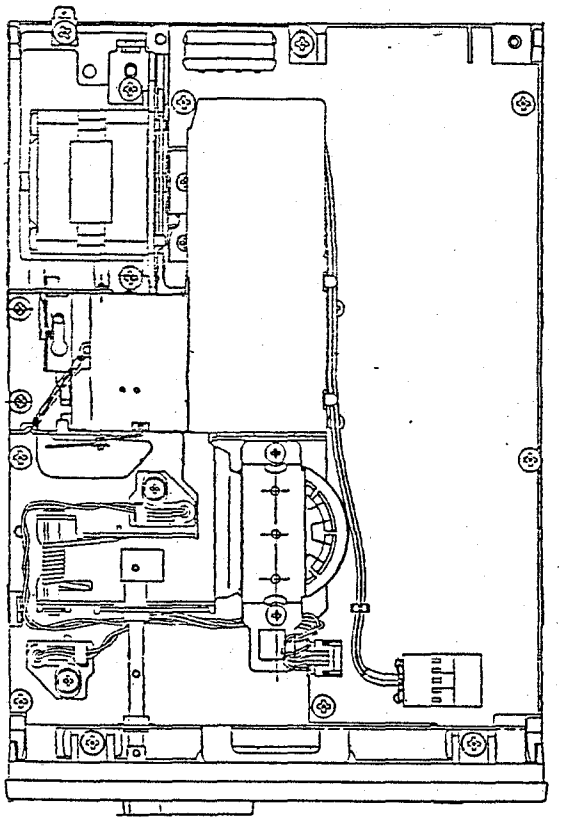
b) Move the head to Track 39 and write 1F by the top and bottom heads.

c) Adjust VR1 to reduce to a minimum the time lags for the top and bottom heads shown in Figure 5-8.

Measuring Conditions

Channel 1-TP5 (0.1V/div) MODE--CH1

Trigger---INT.CH1 Sweep-0.5ms/div



T = 400 ns or less

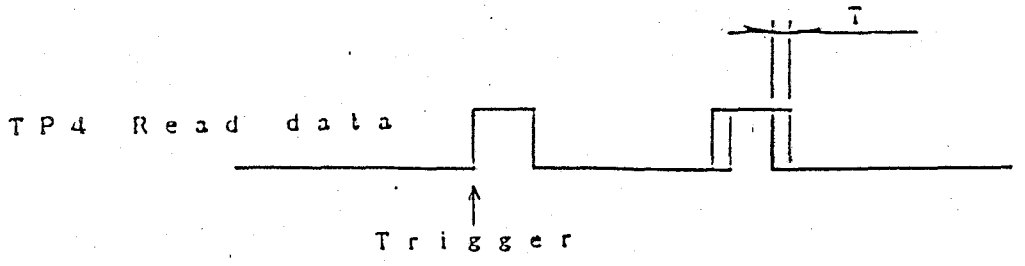


Fig. 5-8

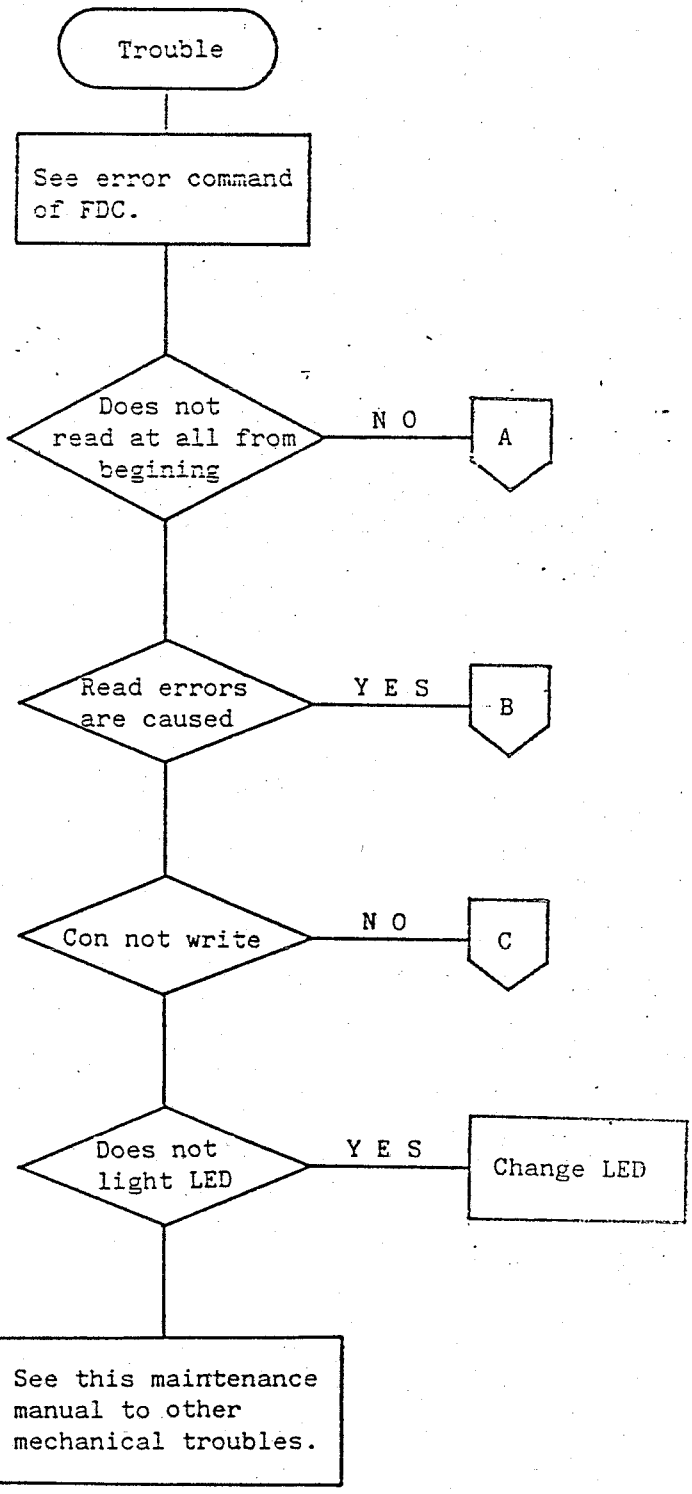
5-9 Write Protect Sensor Check

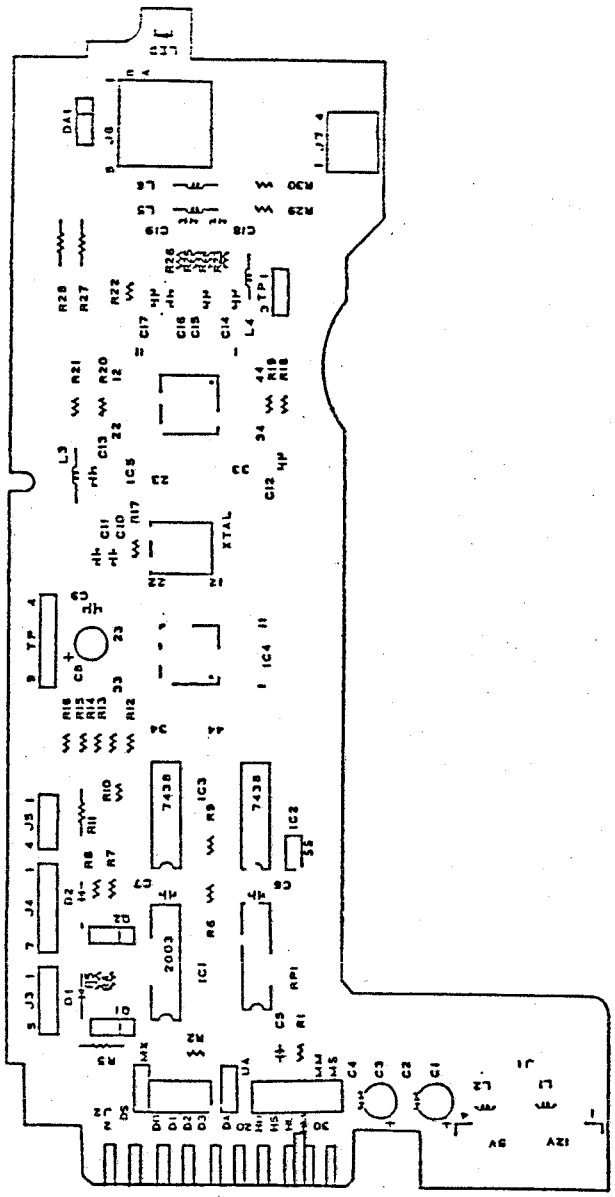
Load and unload a diskette and check that write protect sensing is definitely made using Brikon.

5-10 Head Cleaning

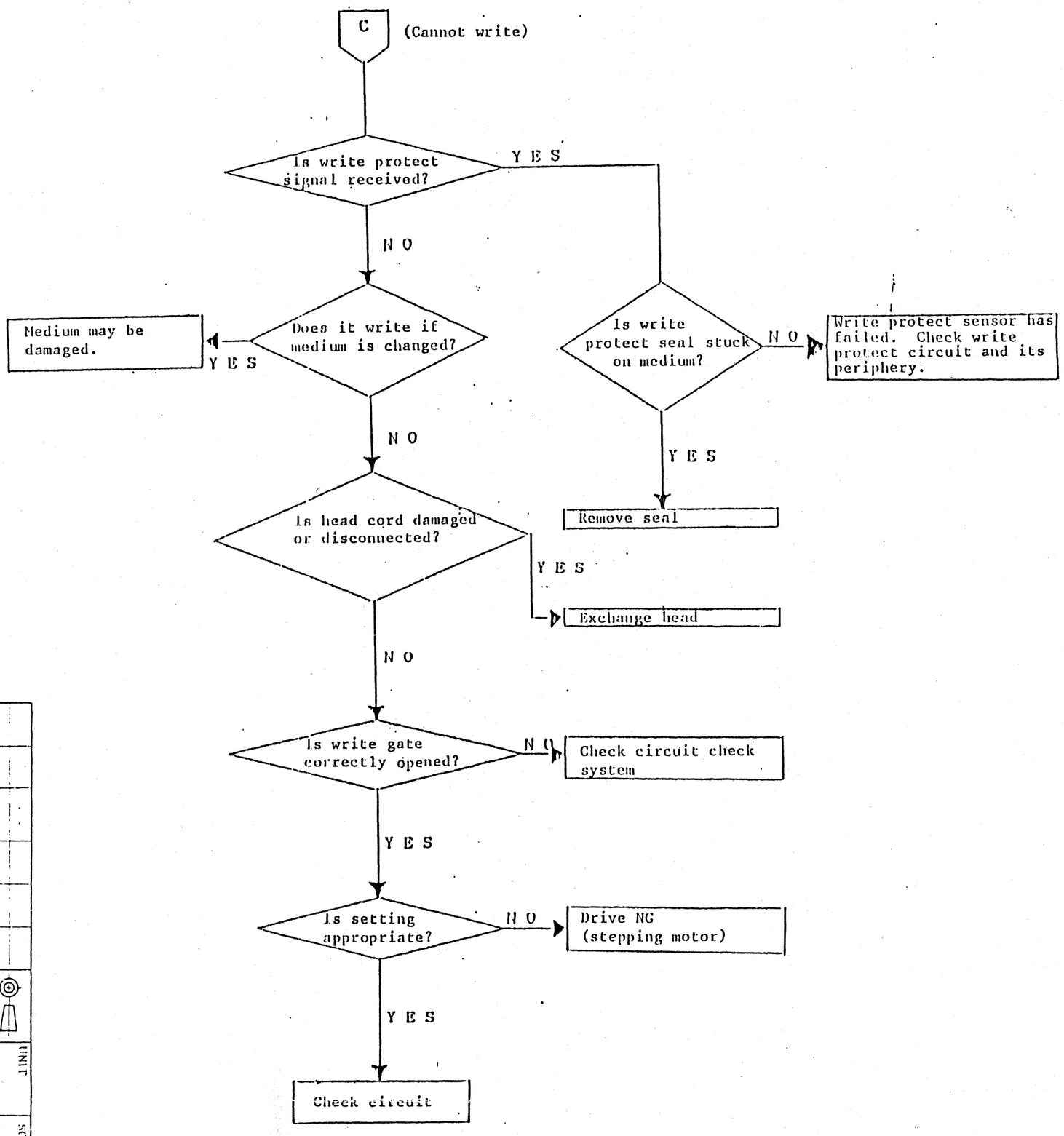
Check for excessive dust or oxidized magnetic iron powders on the load pad using such a dentist's mirror. Clean the heads using a cloth that produces no flues or an applicator dipped in 91% isopropyl alcohol. Clean the heads carefully and remove accumulated dust and oxidized magnetic iron powders. Wipe the head using a cloth that produces no flues.

6. Troubleshooting Hints





PAGE	SYMB.	DATE	APPD.	CHKD.	DSGD.	APPD.	CHKD.	DSGD.	TITLE
								Aug 17 '85	
									DOCUMENT NO.



ZONE SYMB	DATE	APPD	CHKD	DSGD

APPD. CHKD. DSGD. Prof. H. Ishiya

UNIT mm SCALE

TITLE Maintenance Manual

DOCUMENT NO. (39/44)

DFC222A

ALPS ELECTRIC CO., LTD.

B (Read errors are caused)

Is termination resistor correctly attached? — NO → Mount correctly

YES

Is environment condition appropriate? — NO → Set up environmental condition appropriately

YES

Are errors caused after changing to another medium? — NO → Medium may be faulty

YES

Is a very large noise source present? — YES → Remove noise source

NO

Is there sufficient head pressure? — NO → Change head

YES

Are errors caused on inner circumference of tracks? — NO → (back to Is alignment OK?)

YES

Is time margin of inner circumference tracks sufficient? — NO → Change the printed circuit board. Change the head if problem is not solved.

YES

Check data separator on system side

Is alignment OK? — NO → Adjustment

YES

Is spindle speed OK? — NO → Adjustment

YES

Is index signal correctly sent? — NO → Adjustment

YES

Is TRK00 OK? — NO → Adjustment

YES

Is azimuth OK? — NO → Tilting of guide shafts due to shock, or heads are defective

YES

Is seek operation normal? — NO → Check step motor and driving mechanism

YES

Is power correctly fed? — NO → Check power ripple noise

YES

Check circuit

ZONE	SYMB	DATE	APPD	CHKD	DSGD

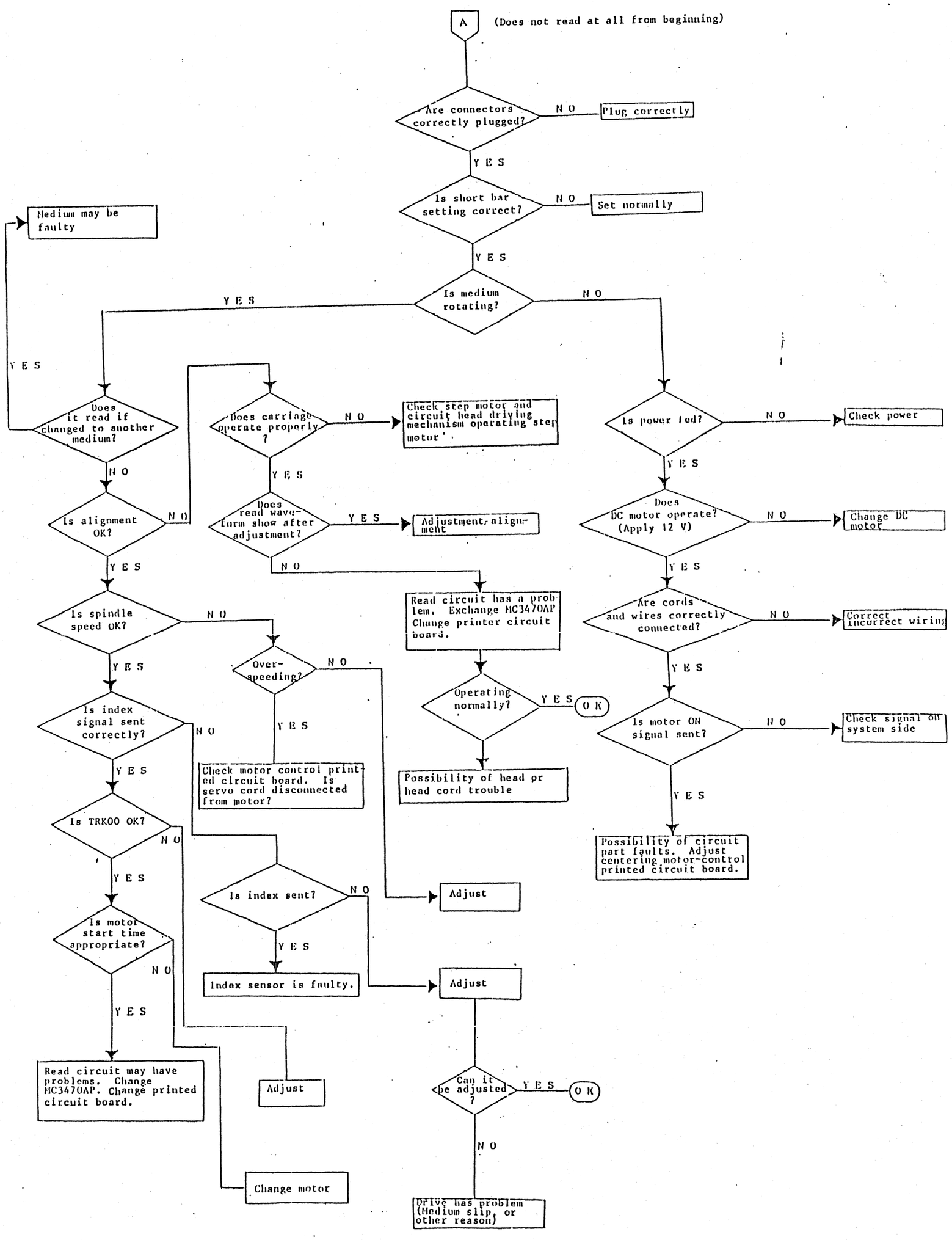
APPD. CHKD. DSGD. May 17, 85

UNIT mm SCALE

TITLE Maintenance Manual

DOCUMENT NO. DFC222A

(40/44)



ZONE	SYMB.	DATE	APPD.	CHKD.	DSGD.

APPD.	UNIT	SCALE	DFC222A
	mm		
CHKD.		DSGD. May. 17. '85 H. Nakaya	TITLE: Maintenance Manual
			DOCUMENT NO. (41/44)

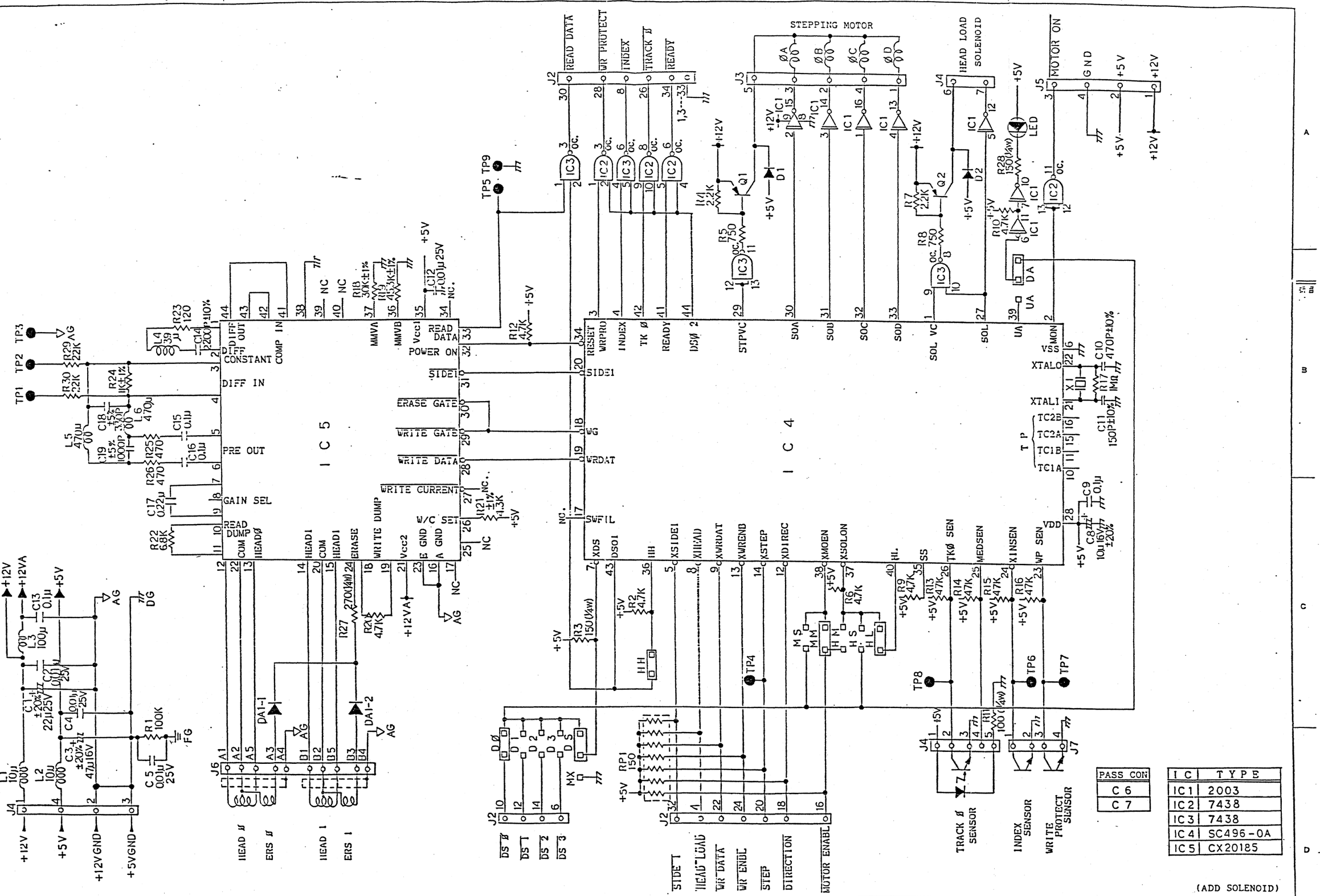
ALPS ELECTRIC CO., LTD.

FOLD

(A3 · 英文印刷用紙)

0002 A3 58.6 500 1

ALPS ELECTRIC CO., LTD.



PASS CON
C 6
C 7

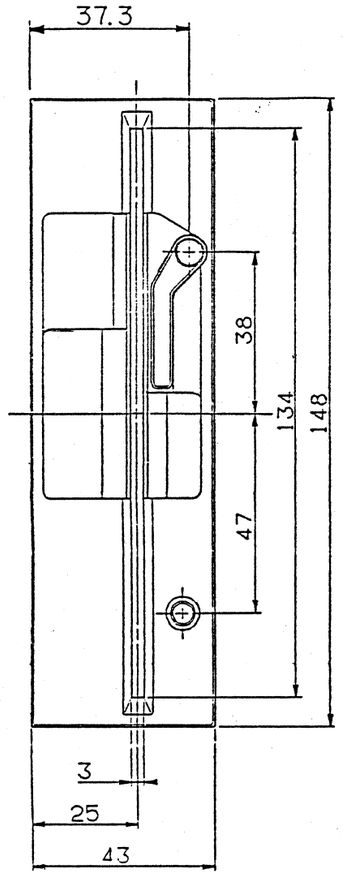
I C	T Y P E
IC1	2003
IC2	7438
IC3	7438
IC4	SC496-0A
IC5	CX20185

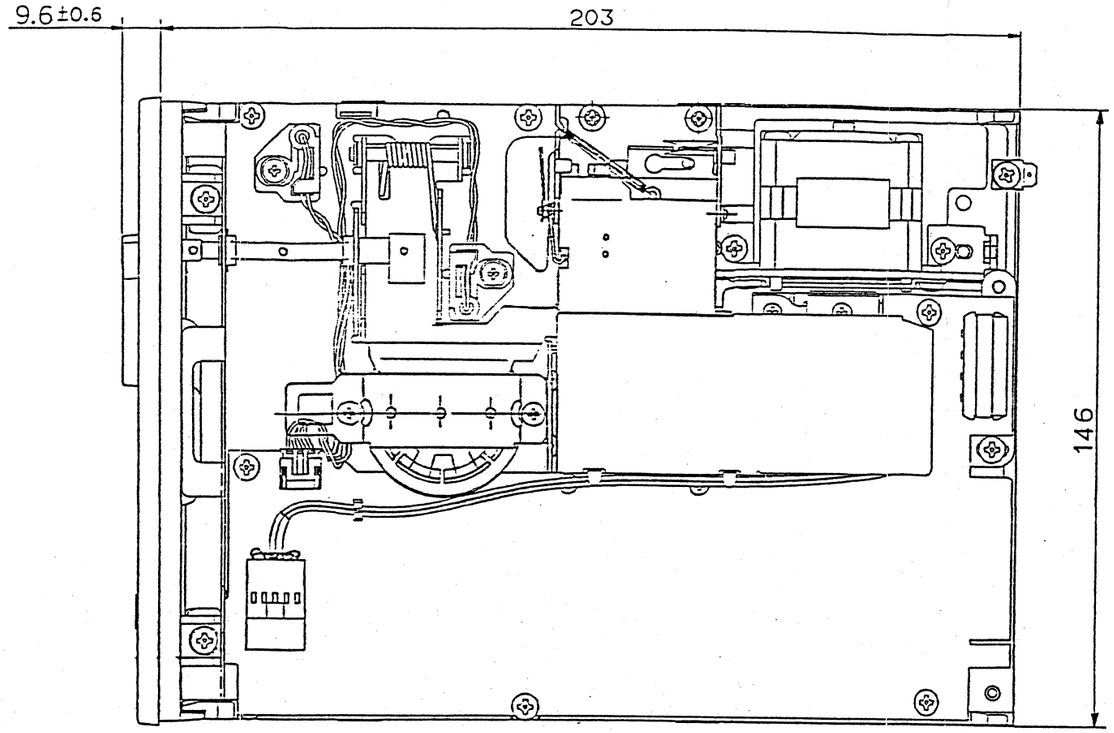
NOTES: UNLESS OTHERWISE SPECIFIED.

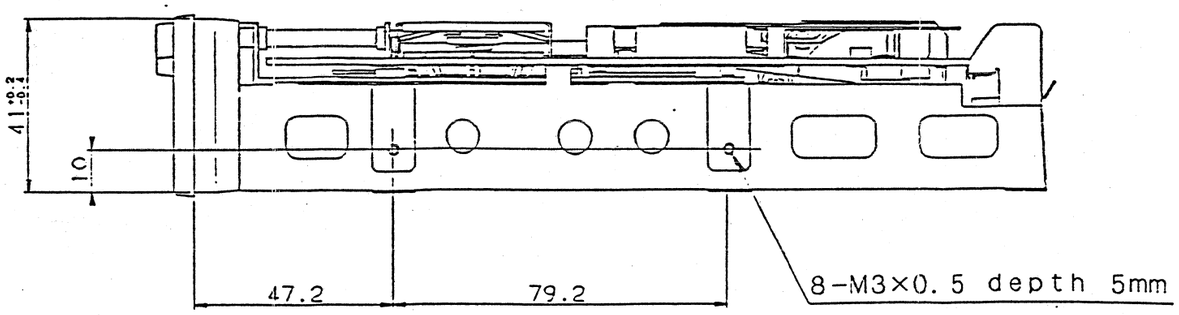
1. ALL CAPACITORS ARE IN MICROFARADS. 50V. +80 -20%.
2. ALL INDUCTORS ARE IN MICROHENRIES. ± 10%.
3. ALL RESISTORS ARE IN OHMS. 1/6W. ± 5%.
4. SOME PARTS VALUES MAY BE MODIFIED WITHOUT PRIOR NOTICE TO IMPROVE THE PERFORMANCE.
5. MAKERS OF IC S ARE "HITACHI", "TOSHIBA", ETC.

ZONE	SYMB.	DATE	APPD.	CHKD.	DSGD.

DIMENSIONS ARE IN	mm
SCALE	
APPD.	
CHKD.	
DSGD.	1987.12.3
TITLE	DFC222A
	CIRCUIT DIAGRAM
DOCUMENT NO.	(43/44)







PART NO.	NAME	MATERIAL	SPEC	FINISH	

ZONE	SYMB.	DATE	APPD.	CHKD.	DSGD.

ALPS ALPS ELECTRIC CO., LTD.

	UNIT	SCALE	
	mm	1/1	DFC222A
APPD.	CHKD.	DSGD. May 17. '85	TITLE: PRODUCT DRAWING
			DOCUMENT NO. (44/44)

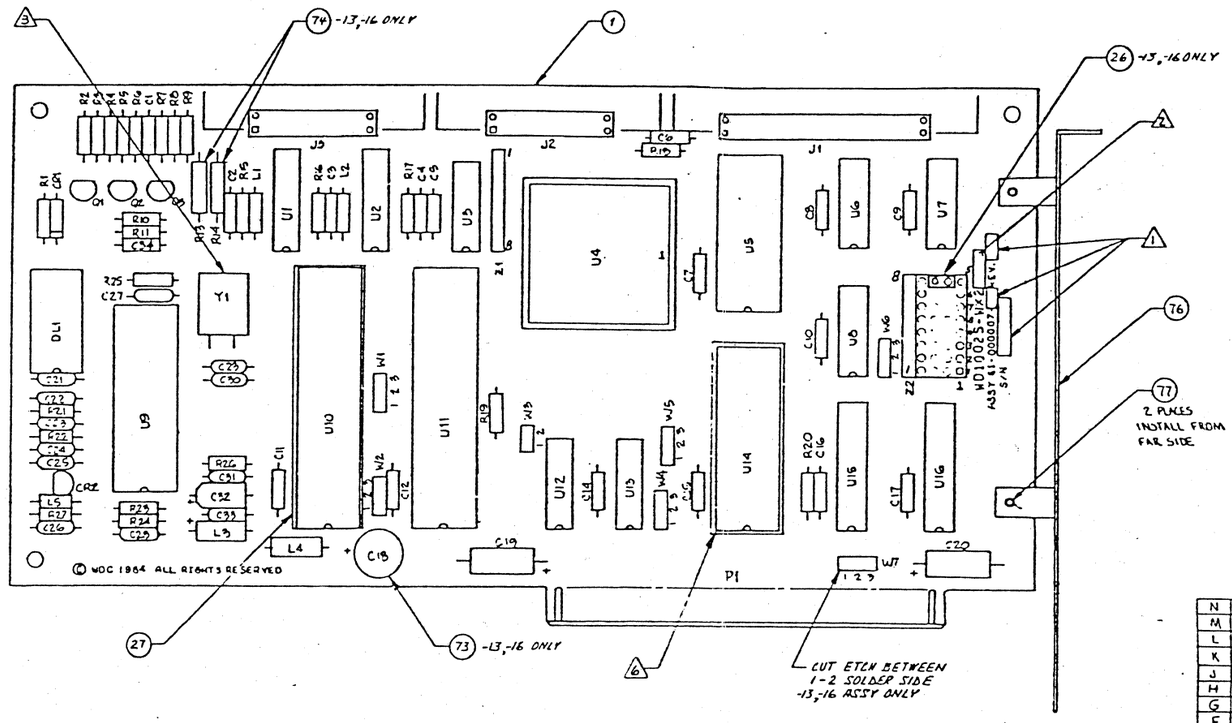
TABULATION BLOCK			
PART NO.	REV	MODEL NO.	VARIABLE
61-000007-00	E	WDK2025-WX2(F000)	8 HEAD, NO BIOS
- 01	G	(F001)	8 HEAD, STD BIOS
- 02	E	(F002)	8 HEAD, STD BIOS, MTG BKT
- 03	F	(F003)	8 HEAD, NO BIOS, MTG BKT.
- 04	D	(F004)	16 HEAD, NO BIOS
- 05	E	(F021)	16 HEAD, STD BIOS
- 06	E	(F022)	16 HEAD, STD BIOS, MTG BKT
- 07	E	(F016)	8 HEAD, STD BIOS, MTG BKT
- 08	E	(C008)	8 HEAD, CUSTOM BIOS
- 09	E	(C010)	8 HEAD,
- 10	E	(C012)	8 HEAD, MTG BKT
- 11	F	(C013)	8 HEAD,
- 12	E	(C015)	8 HEAD, CUSTOM BIOS MTG BKT
- 13	F	F023	8 HEAD, CUSTOM BIOS, CUSTOM BRACKET ⚠5
- 14	G	(F019)	8 HEAD STD BIOS MTG BKT
- 15	E	(F009)	8 HEAD STD BIOS MTG BKT
61-000007-16	D	WD2025-WX2 (F026)	16 HEAD CUSTOM BIOS CUSTOM BRACKET ⚠5
61-000007-17	G	WD2025-WX2 (C014)	8 HEAD, CUSTOM BIOS, MTG BKT
61-000007-18	K	WD1003-WX2(C027)	8 HEAD, CUST BIOS, MTG BKT
61-000007-19	K	WD1003-WX2(C028)	8 HEAD, CUST BIOS, MTG BKT
61-000007-20	K	WD1003-WX2(C029)	8 HEAD, CUST BIOS, MTG BKT

⚠4 JUMPER TABLE (USE W/ P/N 61-300000)

PART NO.	FROM	TO	SIDE
61-000007-13,16	U6-3	J1-29	SOLDER
61-000007-13,16	U6-6	J1-30	SOLDER

⚠5 ETCH CUT TABLE

PART NO.	LOCATION
61-300007-13,16	AT U6-3
61-300007-13,16	AT U6-6
61-000007-13,16	WT BETWEEN 1-2 SOLDER SIDE



JUMPER CONFIGURATION CHART							
PART NUMBER	W1	W2	W3	W4	W5	W6	W7
61-000007-00	1-2	1-2	1-2	2-3	—	2-3	—
01							
02							
03						2-3	
04						1-2	
05						1-2	
06						1-2	
07						2-3	
08							
09							
10							
11							
12	1-2	1-2	1-2	2-3	—	2-3	—
13						2-3	2-3
14						2-3	—
15						2-3	—
16						1-2	2-3
61-000007-17						2-3	—

JUMPER CONFIGURATION CHART							
PART NUMBER	W1	W2	W3	W4	W5	W6	W7
61-000007-18	1-2	1-2	1-2	2-3	—	2-3	—
61-000007-19	1-2	1-2	1-2	2-3	—	2-3	—
61-000007-20	1-2	1-2	1-2	2-3	—	2-3	—

⚠6 WHEN USING OPTIONAL 24 PIN IC- INSTALL PIN 1 OF IC INTO PIN 3 OF SOCKET.

⚠5 MODIFY ASSEMBLY PER JUMPER AND/OR ETCH CUT TABLE.

4. FOR SEPARATE PARTS LIST SEE PL 61-000007.

⚠3 SECURE CRYSTAL Y1 TO PCB PER MFG STANDARDS.

⚠2 IDENTIFY WITH APPLICABLE MODEL NO. APPROX AS SHOWN.

⚠1 IDENTIFY WITH APPLICABLE DASH NO., REV LTR AND SERIAL NO APPROX AS SHOWN.

NOTES: UNLESS OTHERWISE SPECIFIED.

REV	ECO	DESCRIPTION	BY	CK	APPR	DATE
N	2639	REMOVED 'C13'			DMF	3-1-94
M	2518	REV TAB BLOCK			DMF	12-09-93
L	2472	REV CHG ONLY			DMF	12-09-93
K	2276	REV TAB BLOCK			DMF	12-10-93
J	2231	REV. TAB. BLOCK			DMF	12-10-93
H	2207	REV TABULATION BLOCK & TOLERANCES			DMF	9-23-93
G	2168	REVISED TABULATION BLOCK			MH	7-15-93
F	2141	RELEASE -20			DMF	9-21-93
E	2092	RELEASE -18 & -19			DMF	8-21-93
D	2041	RELEASE -17			MH	7-30-93
C	1929	UPDATE BIOS ON F001			MH	7-9-93
B	1900	RELEASE -15 & -16, REVISED U7			MH	6-14-93
A	1826	PILOT RELEASE			DMF	5-31-93
—	1810	ADDED NOTE 6			MH	5-24-93
X10	17602	REV CHANGE TO REFLECT REWORK			MH	5-19-93
X9	1763	REVISED TABULATION BLOCK - CB 1145 X6			MH	5-14-93
X8	1703	ADD 61-000007-14 TO JUMPER CHART			MH	5-04-93
X7	1692	ADD SOCKET AT U10			MH	4-22-93
X6	1681	INCORP -01 PCB (VARIATION CHANGE ONLY)			MH	4-22-93
X5	1654	RELEASE -13 (C023)			MH	4/23/93
X4	1571	REWORK ECO TO REVERSE Z1			MH	4/15/93
X3	1586	RELEASE -07 THRU-12			MH	3/3/93
X2	1496	REV CHANGE ONLY			R.H.	3-30-93
X1	1460	INITIAL RELEASE	(JAN)		DFT	2-27-93
X0	1440	PROTOTYPE RELEASE			DFT	1/19/93

TOLERANCES (UNLESS OTHERWISE NOTED)	SIGNATURE	DATE
FRACS ± 1/32	DRAWN [illegible]	2-19-93
.XX ± .010	CHECK	
.XXX ± .005	ENGINEER [illegible]	2/19/93
ANGLES ± 0°30'	FINISH APPR	
.XXXX ± .0005	0 APPR	
DO NOT SCALE DWG	MFG APPR	

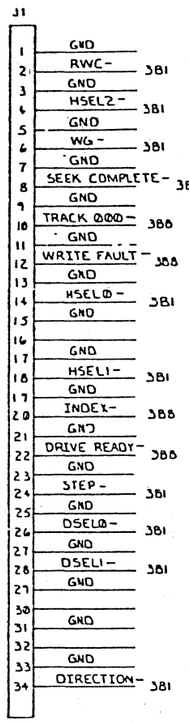
TITLE: ASSEMBLY DRAWING
WD1003-WX2

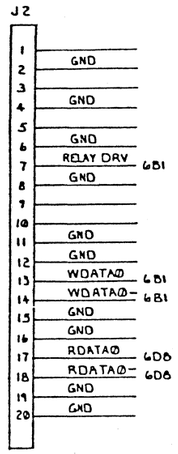
CAGE CODE	BASE NUMBER	DASH	ENG REV CODE	REV	DCC
61	000007	00		N	

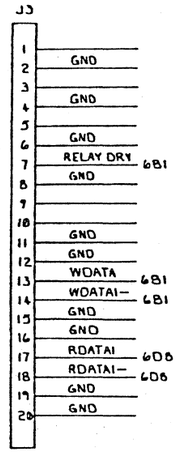
SCALE 2/1 SHT 1 OF 1

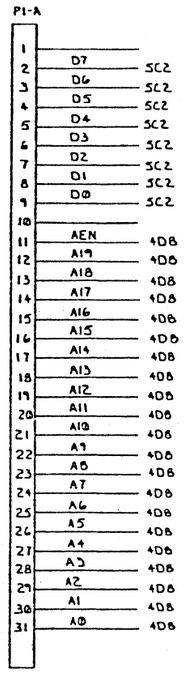
THIS INFORMATION IS CONFIDENTIAL AND PROPRIETARY TO WDC AND SHALL NOT BE REPRODUCED OR FURTHER DISCLOSED TO OTHERS THAN WDC EMPLOYEES WITHOUT WRITTEN APPROVAL FROM WESTERN DIGITAL CORPORATION

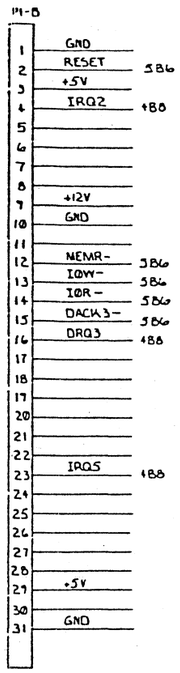
61-000007-16
WD1003-WX2











4 VALUE MAY VARY (TEST SELECT)

3 OPTIONAL PART (SEE ASSEMBLY PARTS LIST)

2. ALL CAPACITORS ARE 50V. ±5%

1. ALL RESISTOR VALUES ARE IN OHMS. ¼W. ±5%

NOTES: UNLESS OTHERWISE SPECIFIED

REV	ECO	DESCRIPTION	BY	CH	APPR	DATE
A	1826	PILOT RELEASE				5-31-85
A2	1591	CHANGE ALL PIN NOS. OF P1 (.5" SQ. PIN #)			PM	11-27-85
X1	N/A	INITIAL RELEASE			RM	2-5-85
10	M6140	PROTOTYPE RELEASE			RM	1-22-85

TOLERANCES (EXCEPT AS NOTED): FRACT ± 1/16, XX ± .010, XXX ± .005, ANGLES ± 0°30', .XX ± .004, .XXX ± .001, DO NOT SCALE DWG.

SIGNATURE / DATE: DRAWN C. KUSUMI 6-6-84; CHECK; ENGINEER; ENGR APPR.; Q.A. APPR.; MFG APPR.

WESTERN DIGITAL CORPORATION

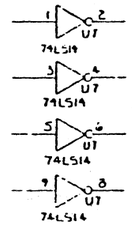
WD1002S-WX2

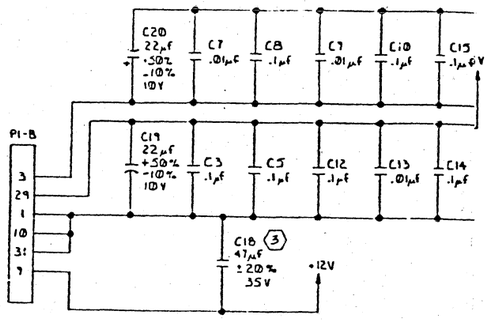
CLASS CODE 68 | BASE NO. 000025 | DASH | CONFIG CODE | REV A | SCALE | SHT 1 OF 6

THIS INFORMATION IS CONFIDENTIAL AND PROPRIETARY TO WDC AND SHALL NOT BE REPRODUCED OR FURNISHED TO ANYONE OTHER THAN WDC EMPLOYEES WITHOUT WRITTEN AUTHORIZATION FROM WESTERN DIGITAL CORPORATION.

WD1002S-WX2
68-000025-00
REV A

SPARES





REV	ECO	DESCRIPTION	BY	CK	APPR	DATE

TOLERANCES	SIGNATURE	DATE
(EXCEPT AS NOTED)	DRAWN	
PLACES	CHECK	
XX ± .010	ENGINEER	
XXX ± .005		
ANGLES ± 0°30'	MFG APPR	
DO NOT SCALE DWG.	Q.A. APPR	

WESTERN DIGITAL
C o r p o r a t i o n

TITLE: WD1002S-WX2

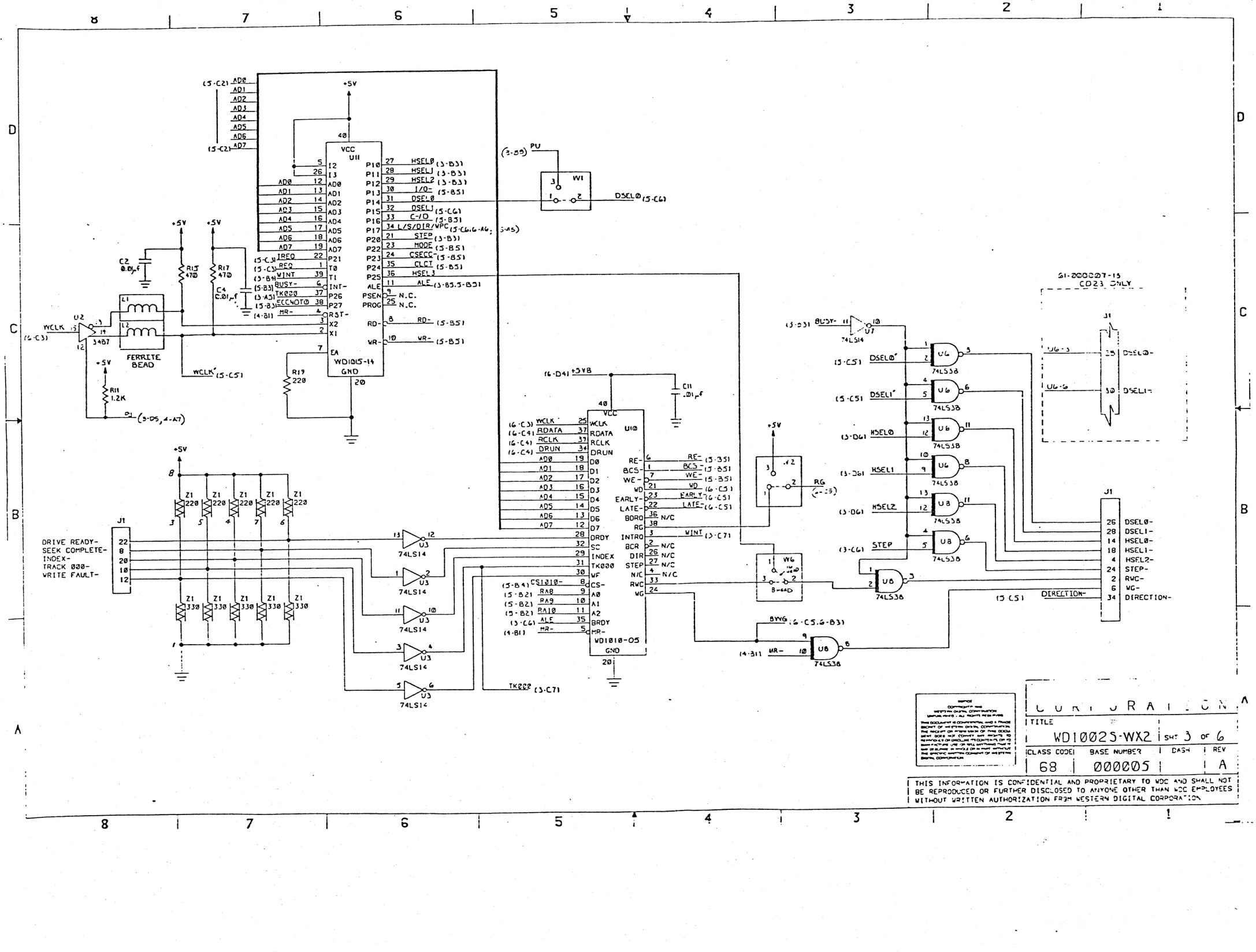
CLASS CODE	BASE NUMBER	SASI P/N CODE	REV	DCC
68	000035		A	

SCALE NONE SHT 2 OF 6

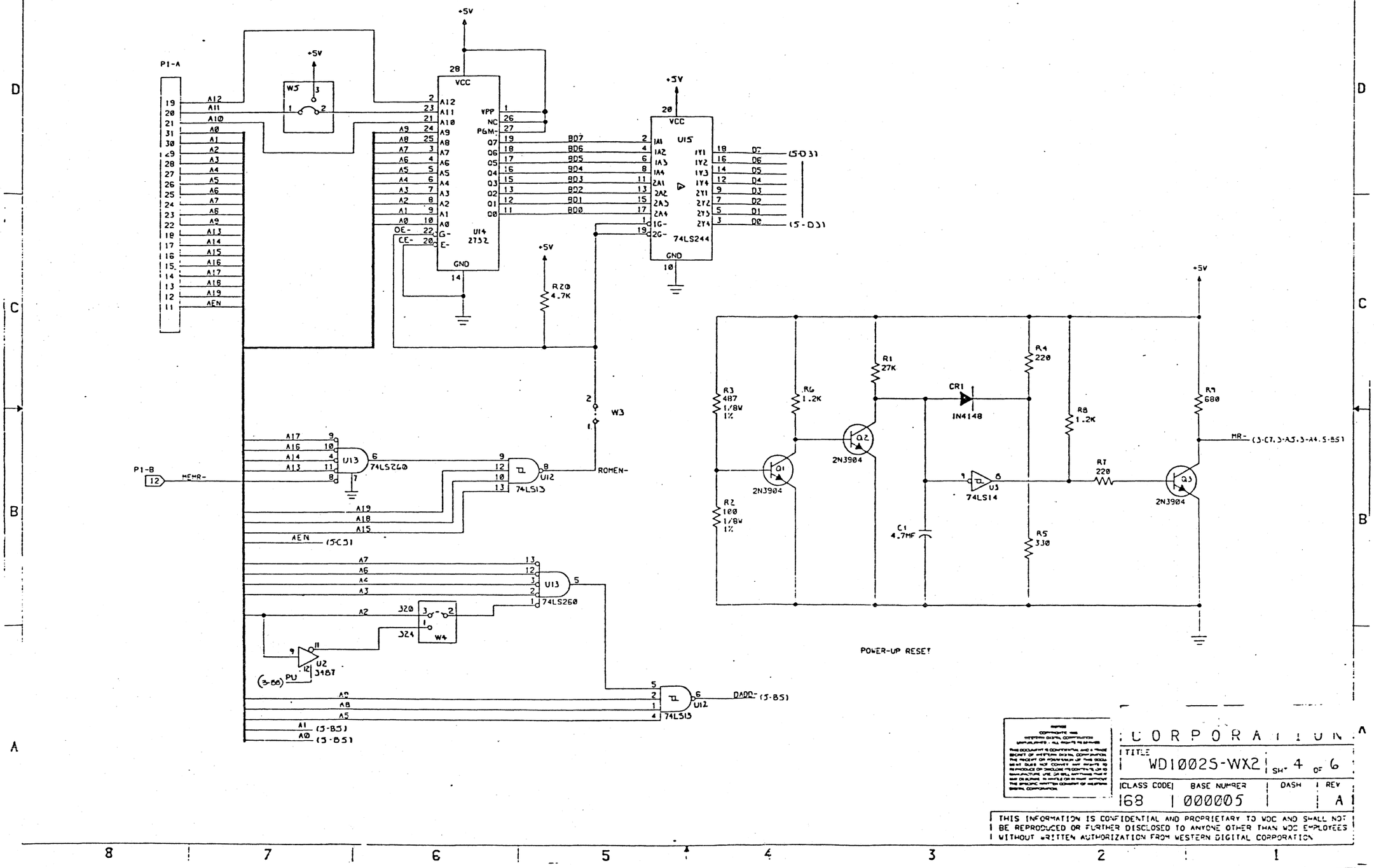
NOTICE
CONFIDENTIAL AND PROPRIETARY INFORMATION
WESTERN DIGITAL CORPORATION
UNPUBLISHED - ALL RIGHTS RESERVED
THIS DOCUMENT IS CONFIDENTIAL AND A TRADE SECRET OF WESTERN DIGITAL CORPORATION. THE RECEIPT OR POSSESSION OF THIS DOCUMENT DOES NOT CONVEY ANY RIGHTS TO REPRODUCE OR DISCLOSE ITS CONTENTS, OR TO MANUFACTURE, USE, OR SELL ANYTHING THAT IT MAY DESCRIBE, IN WHOLE OR IN PART, WITHOUT THE SPECIFIC WRITTEN CONSENT OF WESTERN DIGITAL CORPORATION.

THIS INFORMATION IS CONFIDENTIAL AND PROPRIETARY TO WDC AND SHALL NOT BE REPRODUCED OR FURTHER DISCLOSED TO ANYONE OTHER THAN WDC EMPLOYEES WITHOUT WRITTEN PERMISSION FROM WESTERN DIGITAL CORPORATION

65-000035-00



THIS INFORMATION IS CONFIDENTIAL AND PROPRIETARY TO WDC AND SHALL NOT BE REPRODUCED OR FURTHER DISCLOSED TO ANYONE OTHER THAN WDC EMPLOYEES WITHOUT WRITTEN AUTHORIZATION FROM WESTERN DIGITAL CORPORATION



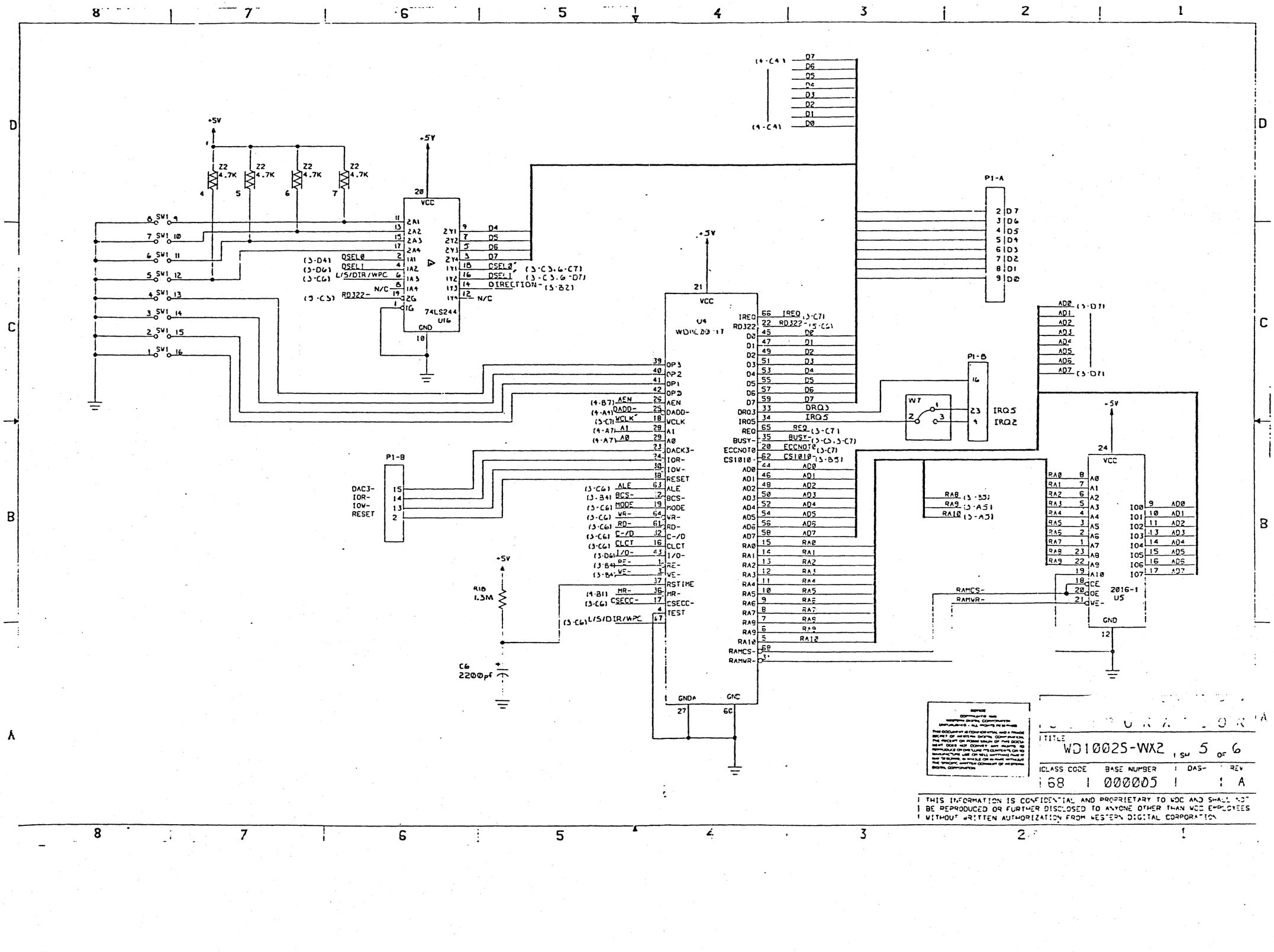
THIS DOCUMENT IS CONFIDENTIAL AND IS THE PROPERTY OF WESTERN DIGITAL CORPORATION. THE RIGHT OF REPRODUCTION OF THIS DOCUMENT IN WHOLE OR IN PART, WITHOUT THE WRITTEN CONSENT OF WESTERN DIGITAL CORPORATION, IS STRICTLY FORBIDDEN.

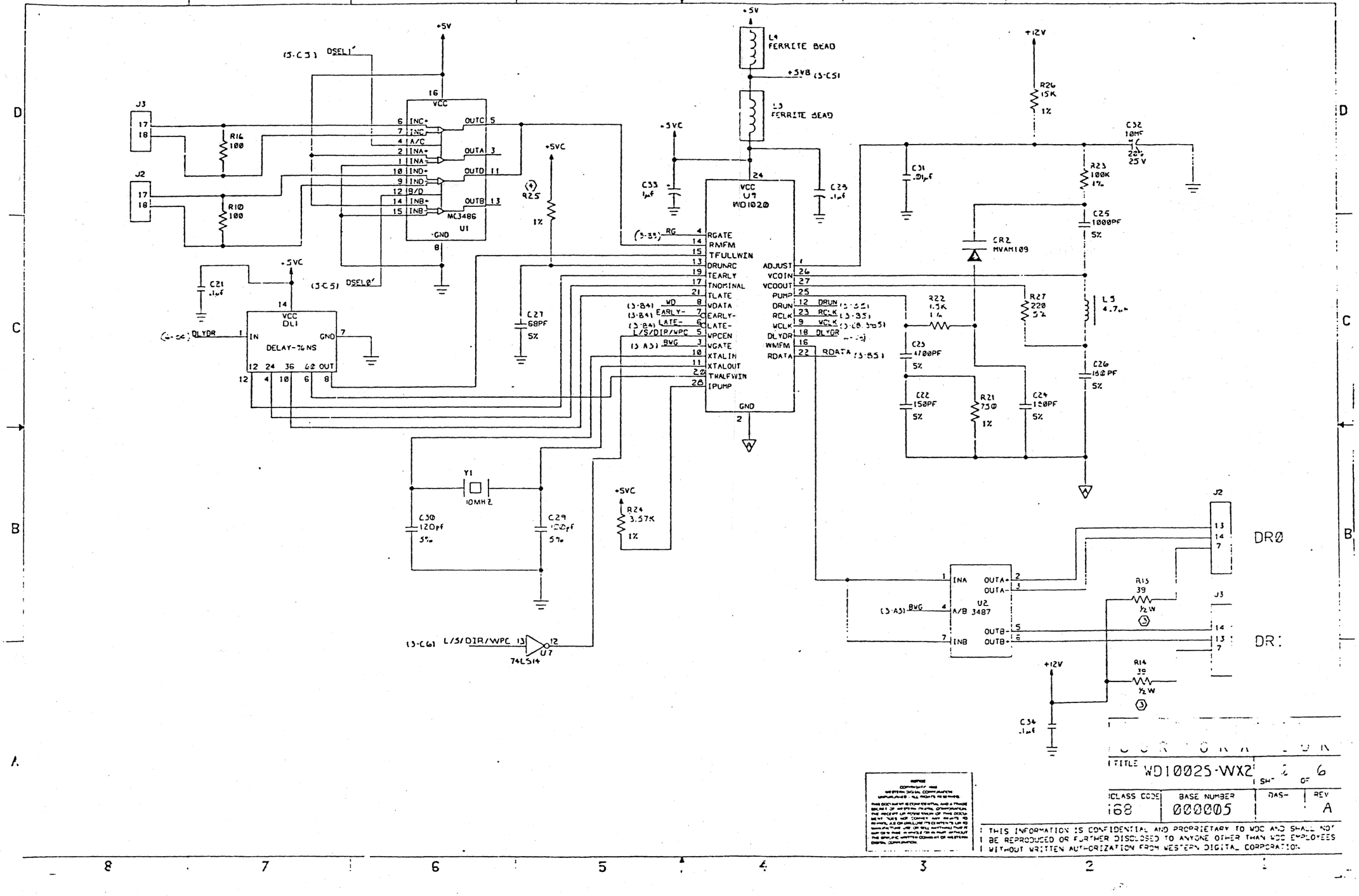
WESTERN DIGITAL CORPORATION

TITLE		SH	OF
WD1002S-WX2		4	6
CLASS CODE	BASE NUMBER	DASH	REV
168	000005		A

THIS INFORMATION IS CONFIDENTIAL AND PROPRIETARY TO WDC AND SHALL NOT BE REPRODUCED OR FURTHER DISCLOSED TO ANYONE OTHER THAN WDC EMPLOYEES WITHOUT WRITTEN AUTHORIZATION FROM WESTERN DIGITAL CORPORATION

WD1002S-WX2
000005-00
A


74LS244
U16
WD1002S-WX2
U5
2016-1
P1-A
P1-B
+5V
VCC
GND
RAMCS-
RAMWR-
IRQ5
IRQ2
RESET
DACK3-
IOR-
IOW-
ALE
BCS-
MODE
RD-
C-/D
CLCT
I/O-
RE-
WE-
MR-
CSECC-
RSTIME
TEST
AEN
DADD-
WCLK
A1
A0
R10
1.5M
C6
2200pf
TITLE
WD1002S-WX2
SH 5 OF 6
ICLASS CODE
68
BASE NUMBER
000005
DASH
REV
A
THIS INFORMATION IS CONFIDENTIAL AND PROPRIETARY TO WDC AND SHALL NOT
BE REPRODUCED OR FURTHER DISCLOSED TO ANYONE OTHER THAN WDC EMPLOYEES
WITHOUT WRITTEN AUTHORIZATION FROM WESTERN DIGITAL CORPORATION


+5V
L4 FERRITE BEAD
+5V8 (3-C5)
L3 FERRITE BEAD
+12V
R26 15K 1%
C32 10MF 22V 25V
(3-C3) DSEL1'
J3
J2
R16 100
R10 100
16 VCC
INC+ INC- A/C INA+ INA- IND+ IND- B/D INB+ INB-
OUTC OUTA OUTD OUTB
MC3486
U1
GND 8
R25 1%
+5VC
C33 1µF
C28 .1µF
C31 .01µF
R23 100K 1%
C25 1000PF 5%
CR2 MVAM109
C21 .1µF
(3-C5) DSEL0'
C27 68PF 5%
24 VCC
U9 WD1020
(3-B5) RG
RGATE RMFM TFULLWIN DRUNRC TEARLY TNOMINAL TLATE VDATA EARLY+ EARLY- LATE+ LATE- VPCEN VGATE XTALIN XTALOUT TWALFWIN IPUMP
ADJUST VCOIN VCOUT PUMP DRUN RCLK WCLK DLYDR WMFM RDATA
(3-B4) WD (3-B4) EARLY- (3-B4) LATE- L/S/DIP/WPC (3-A5) BWG
(3-B5) DRUN (3-B5) RCLK (3-B5) WCLK (3-B5) DLYDR (3-B5) RDATA
R22 1.5K 1%
R27 220 5%
L5 4.7µH
C23 4700PF 5%
C26 150PF 5%
C22 150PF 5%
R21 750 1%
C24 150PF 5%
GND 2
(3-C6) DLYDR
DLI
DELAY-74NS
14 VCC
1 IN
GND 7
12 24 36 48 OUT
12 4 10 6 8
Y1
10MHZ
C30 120pF 5%
C29 120pF 5%
+5VC
RZ4 3.57K 1%
(3-C6) L/S/DIR/WPC
U7
74LS14
J2
DR0
J3
DR1
U2
A/B 3487
(3-A5) BWG
INA INB OUTA+ OUTA- OUTB- OUTB+
R15 39 ½W
R14 39 ½W
C34 .1µF
TITLE WD1002S-WX2
SHT 1 OF 6
CLASS CODE 168
BASE NUMBER 000005
DASH
REV A
THIS INFORMATION IS CONFIDENTIAL AND PROPRIETARY TO WDC AND SHALL NOT BE REPRODUCED OR FURTHER DISCLOSED TO ANYONE OTHER THAN WDC EMPLOYEES WITHOUT WRITTEN AUTHORIZATION FROM WESTERN DIGITAL CORPORATION.